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PERFORMANCE VERIFICATION TRAJECTORIES FOR
THE McDONNELL-DOUGLAS HIGH CROSS-RANGE
SHUTTLE CONFIGURATION

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16. ABSTRACT

Presented in this report are the results of performance verification trajectories based on the McDonnell-Douglas high cross-range two-stage reusable shuttle configuration for three missions as follows: (1) a 92.6 x 185.2 km orbit with an inclination of 55 degrees launched from the Eastern Test Range, (2) a 92.6 x 185.2 km orbit with an inclination of 28.5 degrees launched from the Eastern Test Range, and (3) a 92.6 x 185.2 km orbit with an inclination of 90 degrees launched from the Western Test Range.

These data verify, from a performance consideration only, the data presented by McDonnell-Douglas in reference 1.

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PERFORMANCE VERIFICATION TRAJECTORIES FOR THE
MCDONNELL-DOUGLAS HIGH CROSS-RANGE SHUTTLE CONFIGURATION

SUMMARY

Presented in this report are the results of performance verification trajectories based on the McDonnell-Douglas high cross-range two-stage reusable shuttle configuration for three missions as follows: (1) a 92.6 x 185.2 km orbit with an inclination of 55 degrees launched from the Eastern Test Range; (2) a 92.6 x 185.2 km orbit with an inclination of 28.5 degrees launched from the Eastern Test Range; and (3) a 92.6 x 185.2 km orbit with an inclination of 90 degrees launched from the Western Test Range.

I. INTRODUCTION

The purpose of this study is to verify the performance of the McDonnell-Douglas high cross-range space shuttle configuration as stated in the reference for three missions: (1) insertion of the orbiter with a cargo of 11,339.807 kg (25,000 lbs) into an orbit of 92.6 x 185.2 km with an inclination of 55 degrees with the vehicle being launched from the Eastern Test Range (ETR); (2) insertion of the orbiter with a cargo of 29,483.504 kg (65,000 lbs) into an orbit of 92.6 x 185.2 km with an inclination of 28.5 degrees and launch from the Eastern Test Range; (3) insertion of the orbiter with a cargo of 18,143.694 kg (40,000 lbs) into an orbit of 92.6 x 185.2 km with an inclination of 90 degrees and launch from the Western Test Range.

For all missions investigated, the trajectory shaping and vehicle launch weight were optimized to allow the maximum amount of weight to be placed into orbit. Also, the propellant tanks were loaded to capacity, and this amount was consumed in flight to orbit insertion.

Although there were some discrepancies in weights in the comparisons made between the data obtained from reference 1 and the trajectory simulations, these discrepancies are small and can be attributed to the difference in methods of trajectory simulation.

The defined vehicle for each mission as stated in reference 1 displays the capability of injecting approximately the quoted amount of weight into orbit. Therefore, the data presented in the reference are assumed to be correct from a performance consideration only.

Appendix A contains the data obtained from the reference and the aerodynamic data, Appendix B contains tables and graphs of performance data obtained from the trajectory simulations, and Appendix C contains tables of pertinent trajectory parameters from the simulations along with definitions and symbols.

II. ASSUMPTIONS USED FOR THE TRAJECTORY SIMULATIONS

The following items are the assumptions used for the performance calculations:

1. The configuration aerodynamic data were obtained from McDonnell-Douglas. These data are presented in Appendix A, Table A-4.
2. The weight data for each mission are presented in Appendix A, Tables A-1, A-2, and A-3 as specified in the reference.
3. The missions with cargos of 11,339.807 and 29,843.504 kg with inclinations of 55 and 28.5 degrees, respectively, were launched from Eastern Test Range. The mission with a cargo of 18,143.694 kg and with an inclination of 90 degrees was launched from the Western Test Range.
4. The booster and orbiter were loaded to propellant capacity, and the total amount was consumed in flight to orbit injection. The trajectory shaping was optimized to yield the maximum weight at orbit insertion.
5. The vehicle lifted off with a vertical rise for 8 seconds. A constant pitch rate was initiated at 8 seconds and continued until 20 seconds of flight. A gravity-turn trajectory was simulated thereafter until separation occurred.
6. The vehicle was assumed to be in vacuum flight after orbiter ignition until orbit insertion.
7. A 10-second coast period was assumed for booster and orbiter separation sequence.
8. The orbiter phase of flight was optimized by the Min-H steepest ascent method from orbiter ignition to orbit insertion.

9. The orbiter thrust level and I_{sp} were adjusted to account for orbiter engine cant angles.

10. The earth was assumed to be a rotating ellipsoid.

11. The gross liftoff weight was optimized to yield maximum insertion weight.

12. The acceleration was constrained to a 3-g limit by throttling the engines.

III. EXPLANATION OF RESULTS

The results of this study are presented in graphs and tables of Appendices B and C that are self-explanatory. Tables B-1, B-2, and B-3 of Appendix B give a comparison of weight data for each of the three missions. The comparison is made between the data obtained from the reference and the data from the trajectory simulations. It can be seen from these tables that there are some discrepancies in weights, but these discrepancies are small and can be attributed to the difference in methods of trajectory simulation. The error in any weight difference is less than six-tenths of one percent of the total weight involved. Therefore, the weight data as presented by McDonnell-Douglas in the reference are assumed to be correct from a performance consideration only.

IV. CONCLUSIONS

The defined vehicle for each mission displays the capability of injecting approximately the quoted amount of weight into orbit. Therefore, the quoted amount of cargo for each mission is assumed to be correct since it is a function of the total weight injected into orbit and the propellants necessary to complete the mission. The vehicles designed for missions with inclinations of 28.5 and 55 degrees, respectively, have a cargo capability in excess of the 11,339.807 kg (25,000 lbs) and 29,843.504 kg (65,000 lbs). This can be seen from Tables A-1 and A-2 in Appendix A.

V. PRESENTATION OF DATA

A. Appendix A presents the launch configuration, and weight summaries of the three missions as obtained from the reference along with aerodynamic data.

B. Appendix B presents graphs and tables as compiled by S&E-AERO-GT that were obtained from trajectory simulations.

C. Appendix C presents tables of pertinent trajectory parameters from the simulations along with definitions and symbols.

APPENDIX A

DATA OBTAINED FROM MCDONNELL-DOUGLAS

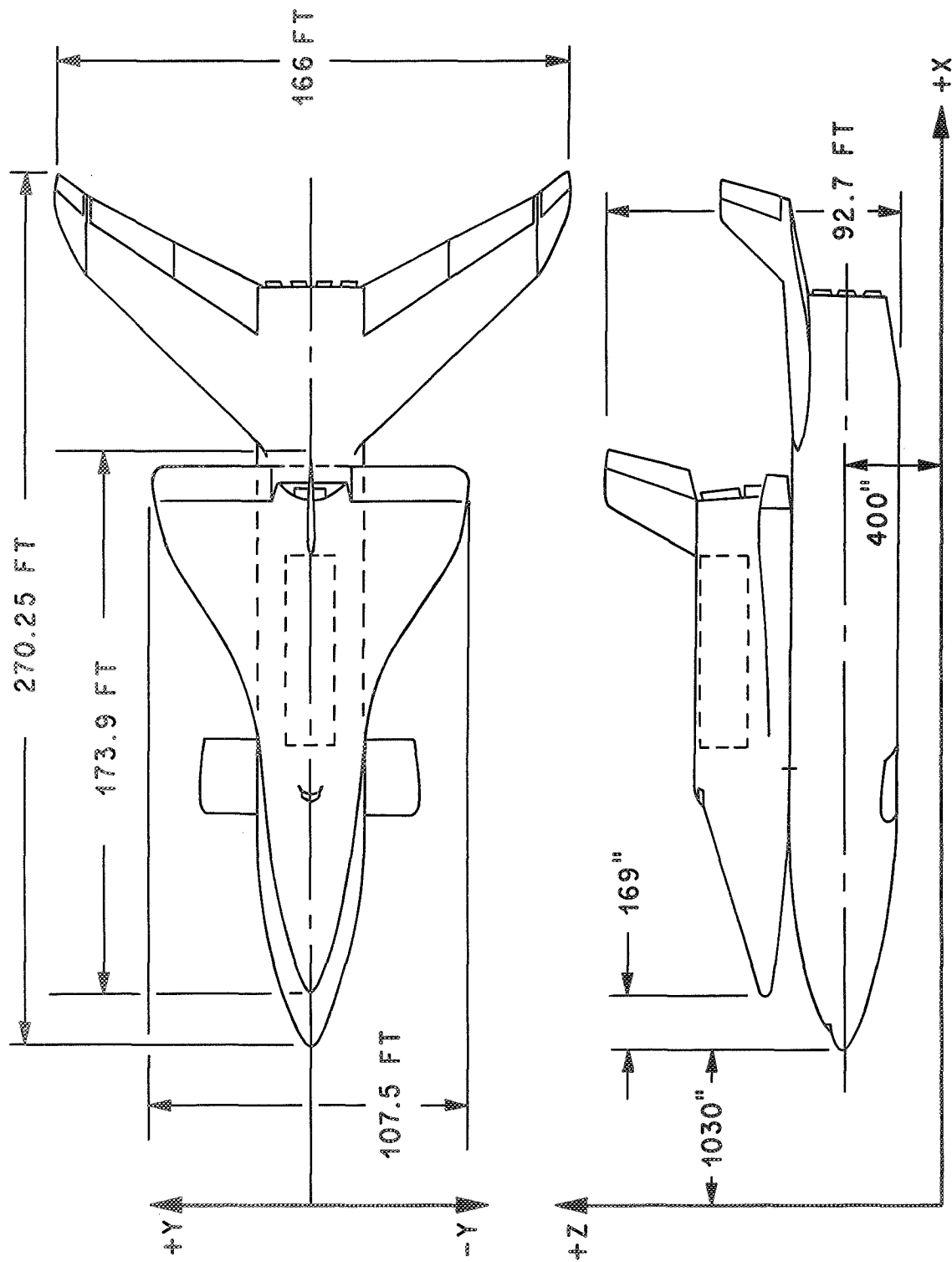


Figure A-1. Configuration/Coordinate Axes High Cross-Range Launch Arrangement

Table A-1. Weight Summary from Reference 1

92.6 x 185.2 km Orbit, 55° Inclination, Cargo 11339,807 kg (25,000 lbs),
Gross Vehicle Lift Weight = 4,624,747 lbs. (All weights presented in pounds)

	Launch Weight		Ignition (Effective)	50% Burn	Injection	On-Orbit	Pre-Retro	Entry	Landing
	Booster	Orbiter							
Wing Group	51458	28311							
Tail Group	14839	5790							
Body Group	146562	62421							
Induced Envir. Protection	76839	32496							
Landing, Recovery, Docking	22810	8963							
Propulsion-Ascent	118120	25275							
Propulsion-Cruise	37116	15246							
Propulsion-Auxiliary	4590	11805							
Prime Power	1698	1878							
Elect. Conver. & Distr.	1363	1364							
Hydra. Conver. & Distr.	5290	2016							
Surface Controls	4910	2613							
Avionics	3932	4457							
Environmental Control	4643	7088							
Personnel Provisions	290	210							
Range Safety & Abort	0	0							
Ballast	0	0							
Growth/Uncertainty	25970	18609							
SUBTOTAL (DRY WEIGHT)	520430	228542							
Personnel	400	400	31073	31073	31073	31073	25000	25000	25000
Cargo	---	31073							
Ordnance	0	0							
Residual Fluids	9867	4107							
SUBTOTAL (INERT. WEIGHT)	530697	264122	264122	264122	264122	264122	258049	258049	258049
Reserve Fluids	11441	14741	14741	14741	14741	8405	8405	8405	8405
In-Flight Losses	22862	10294	8822	8822	8822	3777	0	0	0
Propellant-Ascent	3064000	523996	523996	261998	0	0	0	0	0
Propellant-Cruise	151000	1266	1266	1266	1266	1266	1266	1266	0
Propellant-Maneuver/Acs	1200	29128	29128	29128	29128	15591	10435	1000	0
TOTAL (GROSS-WEIGHT) LB	3781200	843547	842075	580077	318079	293161	278155	268720	266454

Table A-2. Weight Summary from Reference 1

92.6 x 185.2 km Orbit, Inclination of 28.5°, Cargo of 29483.504 kg (65,000 lbs)
 Gross Vehicle Liftoff Weight = 4,638,543 lbs (all weights are presented in pounds)

	Launch Weight		Ignition (Effective)	50% Burn	Injection	On-Orbit	Pre-Retro	Entry	Landing
	Booster	Orbiter							
Wing Group	51458	28311							
Tail Group	14839	5790							
Body Group	146562	62421							
Induced Envir. Protection	76839	32496							
Landing, Recovery, Docking	22810	8963							
Propulsion-Ascent	118120	25275							
Propulsion-Cruise	37116	400							
Propulsion-Auxiliary	4590	11805							
Prime Power	1698	1878							
Elect. Conver. & Distr.	1363	1364							
Hydra. Conver. & Distr.	5290	2016							
Surface Controls	4910	2613							
Avionics	3932	4457							
Environmental Control	4643	7088							
Personnel Provisions	290	210							
Range Safety & Abort	0	0							
Ballast	0	0							
Growth/Uncertainty	25970	17174							
SUBTOTAL (DRY WEIGHT)	520430	212261	212261	212261	212261	212261	212261	212261	212261
Personnel	400	400	400	400	400	400	400	400	400
Cargo	---	79653	79653	79653	79653	79653	40000	40000	40000
Ordnance	0	0	0	0	0	0	0	0	0
Residual Fluids	9827	3883	3883	3883	3883	3883	3883	3883	3883
SUBTOTAL (INERT. WEIGHT)	530657	296197	296197	296197	296197	296197	256544	256544	256544
Reserve Fluids	11441	16482	16482	16482	16482	9944	9944	9944	9944
In-Flight Losses	22862	10294	8822	8822	8822	3777	0	0	0
Propellant-Ascent	3064000	523794	523794	261897	0	0	0	0	0
Propellant-Cruise	149000	0	0	0	0	0	0	0	0
Propellant-Maneuver. ACS	1200	12616	12616	12616	12616	10625	6531	1000	0
TOTAL (GROSS-WEIGHT) LB	3779160	859383	857911	596014	334117	320543	273019	267488	266488

Table A-3. Weight Summary from Reference 1

92.6 x 185.2 km Orbit, 90° Inclination, Cargo 18143.694 kg (40,000 lbs)
Gross Vehicle Liftoff Weight = 4,603,692 lbs (all weights presented in lbs)

	Launch Weight		Ignition (Effective)	50% Burn	Injection	On-Orbit	Pre-Retro	Entry	Landing
	Booster	Orbiter							
Wing Group	51458	28311							
Tail Group	14839	5790							
Body Group	146562	62421							
Induced Envir. Protection	76839	32496							
Landing, Recovery, Docking	22810	8963							
Propulsion-Ascent	118120	25275							
Propulsion-Cruise	37116	400							
Propulsion-Auxiliary	4590	11805							
Prime Power	1698	1878							
Elect. Conver. & Distr.	1363	1364							
Hydra. Conver. & Distr.	5290	2016							
Surface Controls	4910	2613							
Avionics	3932	4457							
Environmental Control	4643	7088							
Personnel Provisions	290	210							
Range Safety & Abort	0	0							
Ballast	0	0							
Growth/Uncertainty	25970	17174							
SUBTOTAL (DRY WEIGHT)	520430	212261							
Personnel	400	400							
Cargo	---	- 40000							
Ordnance	0	0							
Residual Fluids	9947	3883							
SUBTOTAL (INERT. WEIGHT)	530777	256544	256544	256544	256544	256544	256544	256544	256544
Reserve Fluids	11441	15281	15281	15281	15281	9275	9275	9275	9275
In-Flight Losses	22862	10294	8822	8822	8822	3777	0	0	0
Propellant-Ascent	3064000	524326	524326	262163	0	0	0	0	0
Propellant-Cruise	155000	0	0	0	0	0	0	0	0
Propellant-Maneuver. Acs	1200	11967	11967	11967	11967	10231	5822	1000	0
TOTAL (GROSS WEIGHT) LB	3785280	818412	816940	554777	292614	279827	271641	266819	265819

Table A-4. Aerodynamic Data

Reference Area = 929 m^2 ($10,000 \text{ ft}^2$)
 High Cross-Range Configuration

<u>Mach Number</u>	<u>C_{Do}</u>
0.00	.1053
0.40	.0712
0.50	.0705
0.60	.0730
0.75	.0881
1.05	.1652
1.15	.1662
1.25	.1595
2.00	.1120
3.00	.0778
4.00	.0595
5.00	.0472
7.00	.0382
20.00	.0382

APPENDIX B
PERFORMANCE DATA

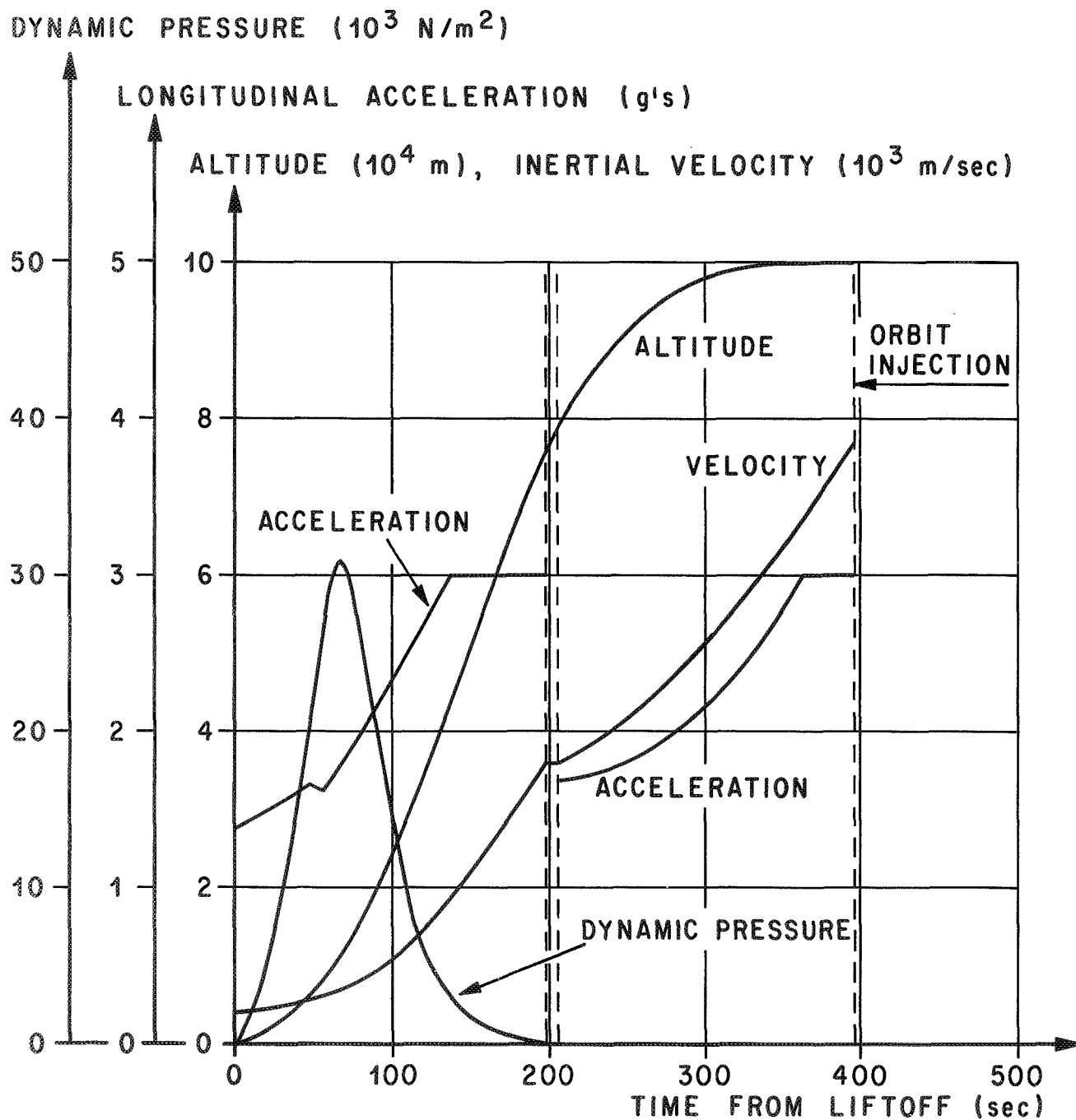


Figure B-1. Design Reference Mission: 92.6 x 185.2 km Orbit, Inclination of 55°, Launched from ETR

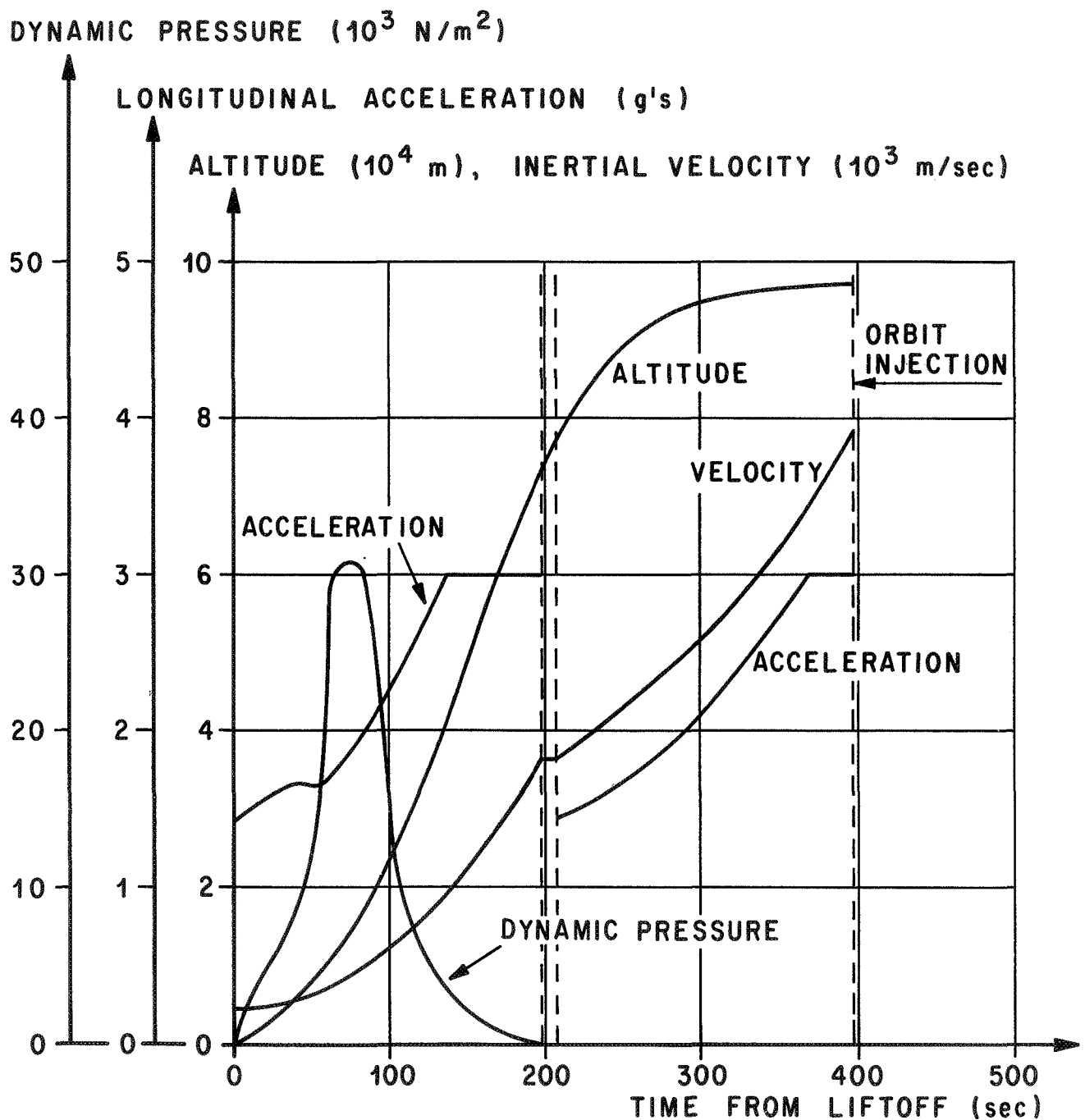


Figure B-2. Due East Mission: 92.6 x 185.2 km Orbit,
Inclination of 28.5°, Launched from ETR

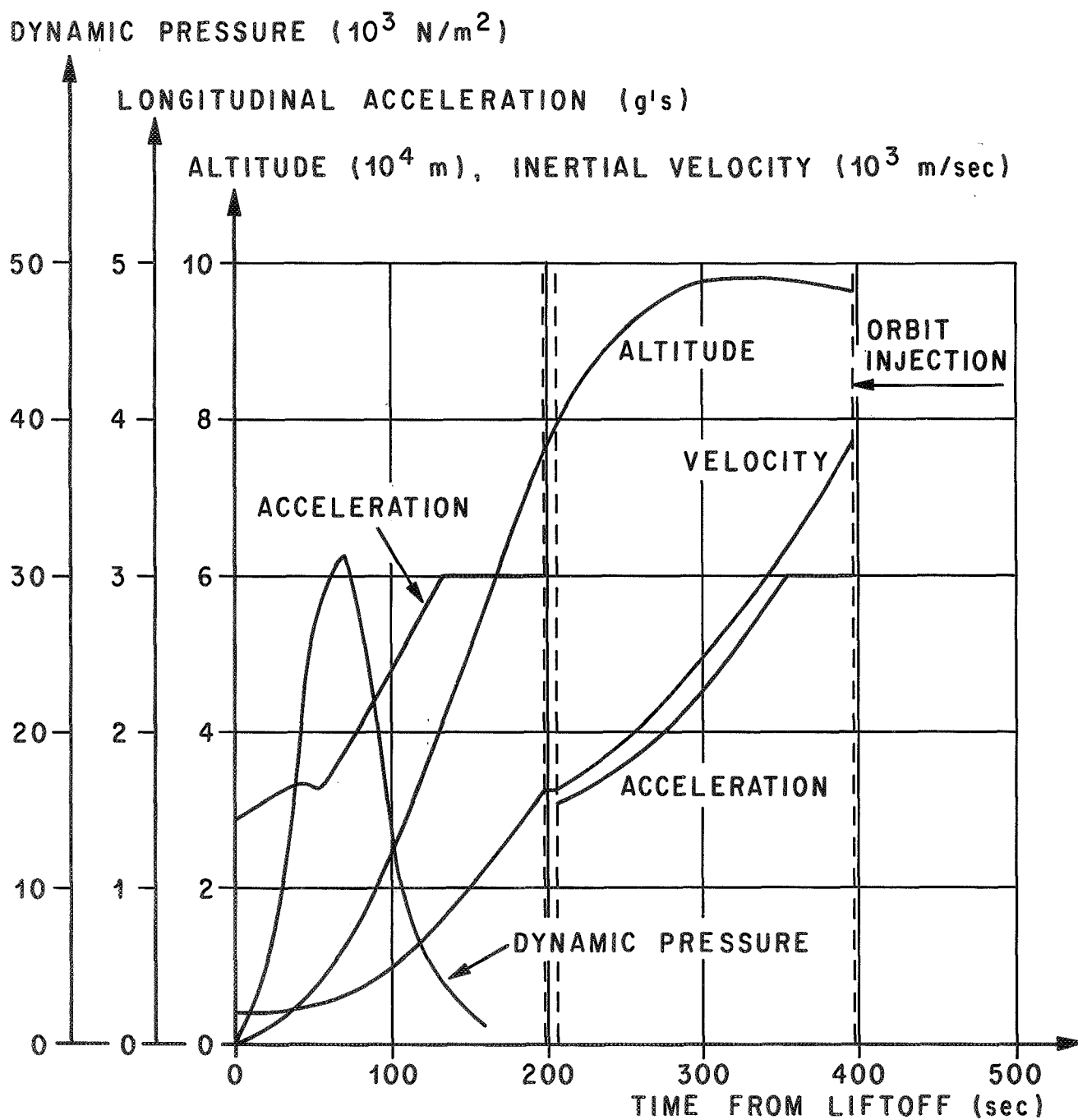


Figure B-3. Polar Mission: 92.6 x 185.2 km Orbit,
Inclination of 90°, Launched from WTR

Table B-1. Design Reference Mission
926 x 185.2 km Orbit, 55° Inclination, 11,339.807 kg Cargo
Launched from KSC

Description of Parameter	Units	MDAC Quoted	MSFC Simulated	△ Weight (Simulated-Quoted)
Gross Liftoff Mass	kg	2,097,750	2,096,981	-769
Booster Propellant Consumed	kg	1,389,807	1,389,807	0
Booster Burn-out Weight*	kg	707,943	707,174	-769
Booster Separation Weight	kg	325,316	325,316	0
Total Orbiter Weight	kg	382,627	381,858	-769
Orbiter Propellant Consumed	kg	237,670	237,683	+ 13
Orbiter Burn-out Weight	kg	144,278	144,175	-113
Total Booster Weight	kg	1,715,115	1,715,115	0
Booster Sea Level Thrust	N/Eng	2,446,521.8	2,446,521.8	0
Booster Vacuum Thrust	N/Eng	2,691,170.3	2,691,170.3	0
Booster Vacuum I _{sp}	sec	439	439	0
No. of Booster Engines	-	12	12	0
Booster Engine Exit Area	m ²	2.40559	2.40559	0
Booster Engine Cant Angle	deg	0	0	0
Orbiter Vacuum Thrust	N/Eng	2,806,765.6	2,806,765.6	0
Orbiter Vacuum I _{sp}	sec	458.12	458.12	0
Number of Orbiter Engines	-	2	2	0
Orbiter Engine Cant Angle	deg	0	0	0

*Total vehicle weight before separation.

Table B-2. Due East Mission

92.6 x 185.2 km Orbit, 28.5° Inclination, 29,483.504 kg Cargo,
Launched from KSC

Description of Parameter	Units	MDAC Quoted	MSFC Simulated	ΔW (Simulated-Quoted)
Gross Liftoff Mass	kg	2,104,008	2,103,151	-857
Booster Propellant Consumed	kg	1,389,807	1,389,807	0
Booster Burn-out Weight*	kg	714,201	713,344	-857
Booster Separation Weight	kg	324,391	324,391	0
Total Orbiter Weight	kg	389,810	388,953	-857
Orbiter Propellant Consumed	kg	237,589	237,682	+ 93
Orbiter Burn-out Weight	kg	151,553	151,270	-283
Total Booster Weight	kg	1,714,198	1,714,198	0
Booster Sea Level Thrust	N/Eng	2,446,521.8	2,446,521.8	0
Booster Vacuum Thrust	N/Eng	2,691,170.3	2,691,170.3	0
Booster Vacuum I _{sp}	sec	439	439	0
No. of Booster Engines	-	12	12	0
Booster Engine Exit Area	m ²	2.40559	2.40559	0
Booster Engine Cant Angle	deg	0	0	0
Orbiter Vacuum Thrust	kg/Eng	2,806,765.6	2,806,765.6	0
Orbiter Vacuum I _{sp}	sec	458.12	458.12	0
No. of Orbiter Engines	-	2	2	0
Orbiter Engine Cant Angle	deg	0	0	0

*Total vehicle weight before separation.

Table B-3. South Polar Mission

92.6 x 185.2 km Orbit, 90° Orbit, 18,143.694 kg Cargo,
Launched from WTR

Description of Parameter	Units	MDAC Quoted	MSCF Simulated	ΔW (Simulated-Quoted)
Gross Liftoff Mass	kg	2,088,199	2,087,442	-757
Booster Propellant Consumed	kg	1,389,807	1,389,807	0
Booster Burnout Weight*	kg	698,392	697,635	-757
Booster Separation Weight	kg	327,167	327,167	0
Total Orbiter Weight	kg	371,225	370,468	-757
Orbiter Propellant Consumed	kg	237,829	237,682	+147
Orbiter Burnout Weight	kg	132,727	132,786	+ 59
Total Booster Weight	kg	1,716,974	1,716,974	0
Booster Sea Level Thrust	N/Eng	2,446,521.8	2,446,521.8	0
Booster Vacuum Thrust	N/Eng	2,691,170.3	2,691,170.3	0
Booster Vacuum I_{sp}	sec	439	439	0
No. of Booster Engines	-	12	12	0
Booster Engine Exit Area	m ²	2.40559	2.40559	0
Booster Engine Cant Angle	deg	0	0	0
Orbiter Vacuum Thrust	N/Eng	2,806,765.6	2,806,765.6	0
Orbiter Vacuum I_{sp}	sec	458.12	458.12	0
No. of Orbiter Engines	-	2	2	0
Orbiter Engine Cant Angle	deg	0	0	0

*Total vehicle weight before separation.

Table B-4. Sequence of Events of the Mission
with an Inclination of 55° and a Cargo of 11,339.807 kg (25,000 lbs)

<u>EVENT</u>	<u>TIME FROM LIFTOFF (sec)</u>
Liftoff	0
Vertical Rise	0-8
Pitch-over Maneuver	8-20 (pitch rate .35 (deg/sec))
Gravity-turn Flight	20-197.441
Maximum Dynamic Pressure	68.202
Booster G-Limit Reached*	135
Separation	197.441
Coast Period	197.441-207.441
Orbiter Ignition	207.441
Optimum Flight	207.441-403.136
Orbiter G-Limit Reached*	364
Orbit Insertion	403.136

* Approximate time.

Table B-5. Sequence of Events of the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

<u>EVENT</u>	<u>TIME FROM LIFTOFF (sec)</u>
Liftoff	0
Vertical Rise	0-8
Pitch-over Maneuver	8-20 (pitch rate = .35 (deg/sec))
Gravity-turn Flight	20-196.988
Maximum Dynamic Pressure	68.604
Booster G-Limit Reached*	134
Separation	196.988
Coast Period	196.988-206.988
Orbiter Ignition	206.988
Optimum Flight	206.988-401.026
Orbiter G-Limit Reached*	364
Orbit Insertion	401.026

* Approximate time.

Table B-6. Sequence of Events of the Mission with an Inclination of 90° and a Cargo of 18,143.694 kg (40,000 lbs)

<u>EVENT</u>	<u>TIME FROM LIFTOFF (sec)</u>
Liftoff	0
Vertical Rise	0-8
Pitch-over Maneuver	8-20 (pitch rate = .346 (deg/sec))
Gravity-turn Flight	20-198.156
Maximum Dynamic Pressure	67.708
Booster G-Limit Reached*	134
Separation	198.156
Coast Period	198.156-208.156
Orbiter Ignition	208.156
Optimum Flight	208.156-407.301
Orbiter G-Limit Reached	356
Orbit Insertion	407.301

* Approximate time.

APPENDIX C
PERFORMANCE TRAJECTORY TABLES

Table C-1. Definitions and Symbols for Trajectory Tables

SYMBOL	TABLE	UNITS	DEFINITION
TIME	ALL	SECONDS	INSTANTANEOUS TIME FROM LIFTOFF
INERTIAL VELOCITY	1	M/SEC FT/SEC	VEHICLE VELOCITY IN THE SPACE FIXED COORDINATE SYSTEM
RELATIVE VELOCITY	1	M/SEC FT/SEC	VEHICLE VELOCITY IN THE EARTH FIXED COORDINATE SYSTEM
GAMMA S	1	DEGREES	FLIGHT PATH ANGLE, MEASURED FROM LOCAL HORIZONTAL TO THE INERTIAL VELOCITY VECTOR
GAMMA R	1	DEGREES	FLIGHT PATH ANGLE, MEASURED FROM LOCAL HORIZONTAL TO THE RELATIVE VELOCITY VECTOR
MASS	2	KILOGRAMS	VEHICLE MASS AT TIME T
WEIGHT	2	POUNDS	VEHICLE WEIGHT AT TIME T
THRUST	2	NEWTONS POUNDS	VEHICLE THRUST AT TIME T
LONGIT. ACCELERATION	2	M/SEC**2 FT/SEC**2	ACCELERATION ALONG THE LONGITUDINAL VEHICLE AXIS
ALTITUDE	3	METERS FEET	DISTANCE FROM CENTER OF EARTH AT TIME T
INCL	3	DEGREES	INSTANTANEOUS INCLINATION
MACH	4	---	MACH NUMBER, BASED ON RELATIVE VELOCITY
DYN PRESSURE	4	N/M**2 LB/FT**2	DYNAMIC PRESSURE DUE TO RELATIVE VELOCITY

Table C-1 (Continued)

SYMBOL	TABLE	UNITS	DEFINITION
ALFP	4	DEGREES	RELATIVE PITCH ATTITUDE ANGLE MEASURED FROM RELATIVE VELOCITY IN ATMOSPHERE. INERTIAL PITCH ATTITUDE ANGLE FOR OUT OF ATMOS. FLIGHT
DRAG	4	N LRS	AXIAL FORCE OF THE VEHICLE
AZ.S	5	DEGREES	AZIMUTH ANGLE MEASURED IN SPACE FIXED SYSTEM FROM NORTH TO SOUTH OVER EAST
LATITUDE	5	DEGREES	GEOCENTRIC LATITUDE OF VEHICLE POSITION AT TIME T
LONGITUDE	5	DEGREES	EARTH RELATIVE LONGITUDE AT TIME T (+EAST)
CHIP	5	DEGREES	APOLLO 13 PITCH ATTITUDE COMMAND
CHTY	5	DEGREES	APOLLO 13 YAW ATTITUDE COMMAND
RANGF	6	KM	SURFACE RANGE FROM THE INSTANTANEOUS LAUNCH SITE POSITION TO THE SURVEHICLE POINT
RANGF ANG.	6	DEG	INERTIAL RANGE ANGLE MEASURED FROM THE INERTIAL RADIUS VECTOR THROUGH THE LAUNCH SITE AT LIFTOFF TO THE VEHICLE GEOCENTRIC RADIUS VECTOR
TOTAL ALPHA	6	DEG	DURING ATMOSPHERIC FLIGHT THE ANGLE BETWEEN THE AERODYNAMIC VELOCITY VECTOR AND THE THRUST VECTOR. DURING VACUUM FLIGHT THE ANGLE BETWEEN THE INERTIAL VELOCITY VECTOR AND THE THRUST VECTOR
IMP. LAT.	6	DEG	LATITUDE OF INSTANTANEOUS VACUUM IMPACT POINT
IMP. LONG.	6	DEG	EARTH RELATIVE LONGITUDE OF INSTANTANEOUS VACUUM IMPACT POINT (+EAST)

Table C-1 (concluded)

SYMBOL	TABLE	UNITS	DEFINITION
AFRO		N-M/M**2	
HEATING INDICATOR	7	LR-FT/FT**2	INTEGRAL $[(Q*VR)/(PI/2-ALPHA))DT]$ FROM 0 TO T
ALPHA*Q	7	N-RADIAN LR-DEGREE	PRODUCT OF ANGLE OF ATTACK AND DYNAMIC PRESSURE
DESC. NODE	7	DGS	ANGLE TO THE DESCENDING NODE OF THE INSTANTANEOUS FLIGHT PLANF MEASURED FROM THE LAUNCH MERIDIAN AT LIFTOFF (+EAST)
X	8	M FT	APOLLO 13 POSITION COORDINATES
Y	8	M FT	APOLLO 13 POSITION COORDINATES
Z	8	M FT	APOLLO 13 POSITION COORDINATES
XDOT	9	M/SEC FT/SEC	APOLLO 13 VELOCITY COMPONENTS
YDOT	9	M/SEC FT/SEC	APOLLO 13 VELOCITY COMPONENTS
ZDOT	9	M/SEC FT/SEC	APOLLO 13 VELOCITY COMPONENTS
XDDOT	10	M/SEC**2 FT/SEC**2	APOLLO 13 ACCELERATION COMPONENTS
YDDOT	10	M/SEC**2 FT/SEC**2	APOLLO 13 ACCELERATION COMPONENTS
ZDDOT	10	M/SEC**2 FT/SEC**2	APOLLO 13 ACCELERATION COMPONENTS

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

MDC/HCR 1-55.0 FUEL 30E4K+524K (25K PAYLOAD)

	TYPE SEC	INERTIAL VELOCITY M/SEC	FT/SEC	RELATIVE VELOCITY M/SEC	FT/SEC	GAMMA S DEG	GAMMA R DEG
LIFT-OFF	.000	408.933	1341.643	.000	.000	-0.000	-6.228
	.000	408.933	1341.643	.000	.000	-0.000	-6.228
	4.000	409.294	1342.827	17.234	56.542	2.413	89.839
	8.000	410.443	1346.596	35.275	115.731	4.930	89.837
BEGIN TILT	8.000	410.443	1346.596	35.275	115.731	4.930	89.837
	12.000	412.875	1354.578	54.131	177.555	7.533	89.157
	16.000	417.151	1368.607	73.831	242.227	10.186	87.720
	20.000	423.371	1389.011	94.439	309.839	12.857	86.022
END TILT	20.000	423.371	1389.011	94.439	309.839	12.857	86.022
	24.000	431.529	1415.778	116.037	380.697	15.520	84.305
	28.000	442.103	1450.471	138.733	455.162	18.119	82.323
	32.000	455.298	1493.768	162.607	533.487	20.600	80.109
	36.000	471.253	1546.104	187.721	615.882	22.905	77.698
	40.000	511.537	1678.272	214.111	702.464	24.979	75.125
	44.000	535.519	1756.951	241.671	792.883	26.768	72.421
	48.000	561.478	1841.924	270.144	886.299	28.220	69.615
	52.000	588.909	1932.115	298.963	980.850	29.287	66.728
	56.000	618.272	2028.451	327.990	1076.084	29.975	63.777
10 KMS.	60.000	639.400	2097.768	357.889	1174.177	30.344	60.778
	62.000	650.606	2134.533	379.080	1243.700	30.461	58.769
	64.000	666.377	2251.892	390.257	1280.370	30.486	57.757
0 MAXIMUM	68.000	688.276	2358.123	425.747	1396.809	30.433	54.746
	72.000	725.880	2581.496	427.626	1402.974	30.425	54.595
	74.000	748.152	2654.567	464.768	1524.828	30.200	51.778
14 KMS.	76.000	769.435	2524.394	486.738	1596.911	30.013	50.250
	80.000	917.321	2681.498	507.731	1665.783	29.808	48.879
	84.000	869.649	2953.179	554.983	1820.811	29.278	46.073
	88.000	926.294	3039.021	606.673	1990.398	28.629	43.379
	92.000	987.176	3238.766	662.631	2174.151	27.875	40.809
	96.000	1052.227	3452.188	722.944	2371.863	27.037	38.368
100.000	100.000	1121.378	3679.061	787.408	2583.558	26.135	36.059
	104.000	1194.557	3919.151	856.014	2808.446	25.186	33.882
	108.000	1271.634	4172.026	928.700	3046.917	24.209	31.833
				1005.336	3298.346	23.215	29.908

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	INERTIAL M/SEC	VELOCITY FT/SEC	RELATIVE VELOCITY		GAMMA S DEG	GAMMA R DEG
			M/SEC	FT/SEC		
112.000	1352.569	4437.561	1085.886	3562.618	22.219	28.100
116.000	1437.753	4715.741	1170.348	3839.725	21.229	26.404
120.000	1526.009	5006.591	1258.730	4129.691	20.253	24.814
124.000	1618.534	5310.150	1351.040	4432.545	19.298	23.323
128.000	1714.969	5626.540	1447.313	4748.403	18.368	21.925
132.000	1815.388	5955.999	1547.618	5077.888	17.466	20.614
136.000	1919.455	6297.425	1651.611	5418.670	16.595	19.346
140.000	2024.679	6642.848	1758.760	5763.650	15.752	18.233
144.000	2130.625	6990.238	1862.633	6111.001	14.938	17.149
148.000	2237.249	7340.057	1969.190	6460.598	14.153	16.128
152.000	2344.514	7691.974	2076.395	6812.319	13.396	15.165
156.000	2452.382	8045.873	2184.214	7166.055	12.669	14.255
160.000	2560.822	8401.648	2292.615	7521.702	11.970	13.395
164.000	2669.804	8759.199	2401.569	7879.162	11.298	12.580
168.000	2779.299	9118.435	2511.047	8238.344	10.654	11.807
172.000	2889.282	9479.271	2621.024	8599.161	10.035	11.075
176.000	2999.728	9841.628	2731.475	8961.534	9.442	10.379
180.000	3110.615	10205.431	2842.377	9325.384	8.874	9.719
184.000	3221.922	10570.611	2953.707	9690.641	8.329	9.091
188.000	3333.628	10937.099	3065.445	10057.235	7.807	8.494
192.000	3445.713	11304.834	3177.571	10425.102	7.306	7.927
196.000	3558.161	11673.758	3290.066	10794.180	6.828	7.387
197.441	3598.744	11806.903	3330.667	10927.386	6.660	7.199
SEPARATION	197.441	11806.903	3330.667	10927.386	6.660	7.199
200.000	3595.939	11797.700	3327.615	10917.372	6.353	6.868
204.000	3591.818	11784.181	3323.128	10902.650	5.873	6.349
207.441	3588.532	11773.399	3319.545	10890.896	5.458	5.902
IGNITION	207.441	3588.532	3319.545	10890.896	5.458	5.902
207.441	3588.532	11773.399	3319.545	10890.896	5.458	5.902
208.000	3596.075	11798.146	3327.084	10915.631	5.415	5.855
216.000	3706.042	12158.931	3437.024	11276.326	4.825	5.204
224.000	3820.024	12532.886	3551.018	11650.321	4.275	4.599
232.000	3938.162	12920.478	3669.203	12038.067	3.763	4.039
240.000	4060.617	13322.233	3791.732	12440.067	3.287	3.521

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	INERTIAL VELOCITY		RELATIVE VELOCITY		VELOCITY		GAMMA S		GAMMA R	
	M/SEC	FT/SEC	M/SEC	FT/SEC			DEG		DEG	
248.000	4187.568	13738.739	3918.782	12856.897			2.848		3.043	
256.000	4319.216	14170.657	4050.549	13289.201			2.442		2.605	
264.000	4455.787	14618.723	4187.253	13737.707			2.071		2.203	
272.000	4597.531	15083.763	4329.143	14203.226			1.731		1.838	
280.000	4744.730	15566.700	4476.497	14696.671			1.422		1.508	
288.000	4897.699	16068.568	4629.628	15189.068			1.144		1.210	
296.000	5056.791	16590.521	4788.886	15711.567			.895		.945	
304.000	5222.402	17133.864	4954.665	16255.463			.675		.711	
312.000	5394.979	17700.063	5127.412	16822.218			.483		.508	
320.000	5575.029	18290.776	5307.630	17413.485			.317		.333	
328.000	5763.123	18907.883	5495.891	18031.138			.179		.188	
336.000	5959.913	19553.522	5692.845	18677.312			.067		.070	
344.000	6165.149	20230.147	5899.239	19354.459			-.019		-.020	
352.000	6382.687	20940.574	6115.932	20065.394			-.080		-.083	
360.000	6610.423	21687.739	6343.816	20813.045			-.115		-.120	
368.000	6844.997	22457.339	6578.528	21583.096			-.129		-.135	
376.000	7079.666	23227.250	6813.315	22353.395			-.127		-.132	
384.000	7314.466	23997.593	7048.217	23124.073			-.109		-.113	
392.000	7549.363	24768.252	7283.201	23895.018			-.075		-.078	
400.000	7784.318	25539.102	7518.227	24666.100			-.024		-.025	
403.136	7976.417	25841.264	7610.350	24968.340			-.000		-.000	
403.136	7876.417	25841.264	7610.350	24968.340			-.000		-.000	
INJECTION										

Table C-2. Trajectory Tables for the Mission with an Inclination of 55° and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MDC/HCR 1=55.0 FUEL 3064K+524K (25K PAYLOAD)

	TIME SEC	MASS KGS	WEIGHT LBS	THRUST N	LBS	LONGIT. ACCELERATION M/SEC ² 0 FI/SEC ² 50
LIFT-OFF						
	0.000	2096980.7	4623051.2	29358262.0	6599999.9	13.97 45.84
	0.100	2096980.7	4623051.2	29358262.0	6599999.9	13.97 45.84
	4.000	2066975.5	4556900.8	29369628.0	6602555.1	14.20 46.59
	8.000	2036970.2	4490750.5	29404510.7	6610397.0	14.40 47.26
	8.000	2036970.2	4490750.5	29404510.7	6610397.0	14.40 47.26
REGIN TILT						
	12.000	2006964.9	4424600.1	29463132.2	6623575.7	14.61 47.93
	16.000	1976959.6	4358449.7	29545420.2	6642074.7	14.82 48.62
	20.000	1946954.3	4292299.4	29650560.7	6665711.2	15.04 49.34
	20.000	1946954.3	4292299.4	29650560.7	6665711.2	15.04 49.34
FND TILT						
	24.000	1916949.0	4226149.1	29777166.5	6694173.4	15.27 50.11
	28.000	1886943.7	4159998.7	29923193.2	6727001.5	15.52 50.93
	32.000	1856938.4	4093848.4	30085916.0	6763583.0	15.76 51.72
	36.000	1826933.1	4027698.1	30262046.7	6803178.8	16.00 52.49
	40.000	1796927.8	3961547.7	30447741.0	6844924.5	16.20 53.16
	44.000	1766922.5	3895397.4	30638882.2	6887894.8	16.36 53.68
	48.000	1736917.2	3829247.1	30831133.5	6931114.6	16.34 53.61
	52.000	1706912.0	3763096.7	31020006.0	6973574.8	16.22 53.21
	56.000	1676906.7	3696946.4	31201394.7	7014352.6	16.05 52.55
10 KMS.						
	60.000	1646901.4	3630796.0	31371787.7	7052658.5	16.26 53.36
	62.660	1626950.9	3586812.7	31477826.7	7076497.0	16.57 54.36
	64.000	1616896.1	3564545.7	31578887.2	7087975.9	16.73 54.90
	68.000	1586890.8	3498495.3	31671205.5	7119970.3	17.28 56.68
0 MAXIMUM						
	68.202	1585378.1	3495160.5	31677477.7	7121485.9	17.30 56.77
	72.000	1556885.5	34322346.0	31796726.5	7148182.5	17.91 58.75
14 KMS.						
	74.024	1541180.9	3397722.2	31855375.7	7161373.4	18.27 59.94
	76.000	1526880.2	3366194.7	31904457.5	7172407.4	18.62 61.09
	80.000	1496874.9	3300044.3	31994107.5	7192560.4	19.40 63.66
	84.000	1466869.6	3233894.0	32065944.5	7208711.1	20.17 66.17
	88.000	1436864.3	3167743.6	32121540.0	7221209.5	20.91 68.61
	92.000	1406859.1	3101593.3	32164262.2	7230813.9	21.65 71.02
	96.000	1376853.8	3035443.0	32196792.5	7238126.9	22.39 73.41
100.000		1346848.5	2969297.6	32221380.5	7243659.6	23.10 75.78
104.000		1316843.2	2903142.3	32239882.5	7247813.9	23.81 78.11
108.000		1286837.9	2836992.0	32253799.2	7250942.6	24.51 80.40

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	MASS KGS	WEIGHT LBS	THRUST N	LBS	LONGIT. ACCELERATION M/(SEC)SQ FT/(SEC)SQ
112.000	1256832.6	2770841.6	32264178.2	7253275.9	25.21
116.000	1226827.3	2704691.3	32271874.7	7253006.1	25.93
120.000	1196822.0	2638540.9	32277570.2	7252286.5	26.67
124.000	1166816.7	2572390.6	32281779.5	7252332.8	27.42
128.000	1136811.5	2506240.2	32284889.2	7252931.9	28.20
132.000	1106806.2	2440089.9	32287189.5	7253449.0	29.01
136.000	1076801.8	2374263.6	31825570.5	7154672.9	29.42
140.000	1046797.4	2308889.9	30941115.5	6955839.5	29.42
144.000	1016793.0	2247383.8	30061611.5	6763638.2	29.42
148.000	991826.2	2186502.5	29258462.0	657563.9	29.42
152.000	965014.4	2127492.6	28455744.2	6397105.8	29.42
156.000	939399.0	2070004.0	27676710.2	6221972.0	29.42
160.000	913574.6	2014087.3	26921264.2	6052141.0	29.42
164.000	888902.0	1959693.5	26188564.0	5882445.9	29.42
168.000	864900.8	1906779.9	25476711.0	5727392.5	29.42
172.000	841553.3	1855307.4	24784791.7	5571842.9	29.42
176.000	818838.1	1805229.0	24112193.2	5420636.7	29.42
180.000	796739.8	1756510.7	23458385.2	5273654.8	29.42
184.000	775240.4	1709112.5	22822762.2	5130751.1	29.42
188.000	754323.5	1662998.7	22204774.0	4991831.8	29.42
192.000	733972.8	1618133.1	21603876.0	4855744.6	29.42
196.000	714172.7	1574481.3	21019549.5	4723382.7	29.42
197.441	707173.7	1559051.2	20813068.7	4678964.0	29.42
197.441	381857.3	841851.2	.0	.0	.00
200.000	381857.3	841851.2	.0	.0	.00
204.000	381857.3	841851.2	.0	.0	.00
207.441	381857.3	841851.2	.0	.0	.00
207.441	381857.3	841851.2	.0	.0	.00
208.000	381158.3	840310.2	6399084.1	1430323.3	16.73
216.000	371162.3	818272.8	5613531.1	1261972.0	14.70
224.000	361166.3	795235.4	5613531.1	1261972.0	14.73
232.000	351170.3	774198.0	5613531.1	1261972.0	15.17
240.000	341174.3	752160.6	5613531.1	1261972.0	15.54
					50.99
					52.44
					53.98

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WDC/HCR I=55.0 FUFL 3064K*574K (25K PAYLOAD)

TIME SEC	WACC KGC	WFLGHT LBS	THRUST		LRS	LONGIT. ACCELERATION	
			N			M/(SEC)SQ	FT/(SEC)SQ
248.000	331178.3	730123.2	5613531.1		1261972.0	16.95	55.61
256.000	321192.3	708185.6	5613531.1		1261972.0	17.48	57.34
264.000	311196.3	686048.4	5613531.1		1261972.0	18.04	59.18
272.000	301190.3	664011.0	5613531.1		1261972.0	18.64	61.15
280.000	291194.3	641973.6	5613531.1		1261972.0	19.28	63.25
288.000	281198.3	619936.2	5613531.1		1261972.0	19.96	65.50
296.000	271202.3	597898.8	5613531.1		1261972.0	20.70	67.91
304.000	261206.3	575861.4	5613531.1		1261972.0	21.49	70.51
312.000	251210.3	553824.0	5613531.1		1261972.0	22.35	73.31
320.000	241214.3	531786.6	5613531.1		1261972.0	23.27	76.35
328.000	231218.3	509749.2	5613531.1		1261972.0	24.28	79.65
336.000	221222.3	487711.7	5613531.1		1261972.0	25.38	83.25
344.000	211226.3	465674.4	5613531.1		1261972.0	26.58	87.19
352.000	201230.3	443636.9	5613531.1		1261972.0	27.90	91.52
360.000	191234.6	421599.0	5613531.1		1261972.0	29.35	96.30
368.000	181274.3	400082.4	533895.6		120027.2	29.42	96.52
376.000	172211.8	373652.0	5066461.6		1138985.9	29.42	96.52
384.000	163422.2	360284.2	4807872.2		1080852.7	29.42	96.52
392.000	155091.2	341895.5	4562481.2		1025686.6	29.42	96.52
400.000	147166.0	324445.4	4329614.9		973336.1	29.42	96.52
433.136	144174.9	317851.2	4241618.3		953553.7	29.42	96.52
403.136	144174.9	317851.2	4241618.3		953553.7	29.42	96.52

INJECTION

Table C-2. Trajectory Tables for the Mission with an Inclination of 55° and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

	TIME SEC	ALTITUDE M	FT	RADIUS M	FT	INCL DEG
LIFT-OFF	.000	-0.19	-6	6373318.44	20909837.2	28.3698
	.000	-0.19	-6	6373318.44	20909837.2	28.3698
	4.000	33.94	111.3	6373352.56	20909949.2	28.3698
	8.000	138.75	455.2	6373457.37	20910293.0	28.3698
BEGIN TILT	8.000	138.75	455.2	6373457.37	20910293.0	28.3698
	12.000	317.19	1040.6	6373635.81	20910878.5	28.3700
	16.000	572.75	1879.1	6373891.31	20911716.7	28.3718
	20.000	908.50	2980.6	6374227.06	20912818.2	28.3791
END TILT	20.000	908.50	2980.6	6374227.06	20912818.2	28.3791
	24.000	1327.69	4355.9	6374646.12	20914193.2	28.3973
	28.000	1833.50	6015.4	6375151.81	20915852.2	28.4384
	32.000	2428.81	7968.5	6375746.94	20917804.7	28.5194
	36.000	3116.19	10223.7	6376434.00	20920059.0	28.6625
	40.000	3897.19	12786.0	6377214.62	20922620.0	28.8931
	44.000	4772.50	15657.8	6378099.31	20925489.7	29.2352
	48.000	5740.94	18835.1	6379057.00	20928664.5	29.7052
	52.000	6799.12	22303.5	6380113.25	20932130.0	30.3054
	56.000	7937.81	26042.7	6381251.75	20935865.2	31.0279
10 KMS.	60.000	9152.56	30029.1	6382465.06	20939945.7	31.8647
	62.000	10000.00	32808.4	6383311.44	20942622.7	32.4853
	64.000	10939.12	34249.1	6383749.94	20944061.2	32.8163
	66.000	11796.75	38703.2	6385105.50	20948508.7	33.8677
0 MAXIMUM	68.202	11967.06	39933.9	6385175.75	20948739.2	33.9230
	72.000	13224.62	43387.9	6386531.06	20953185.7	34.9957
14 KMS.	74.094	14000.06	45932.0	6387305.06	20955725.0	35.6083
	76.000	14722.62	48302.6	6388026.31	20958091.5	36.1752
	80.000	16290.31	53445.9	6389590.75	20963224.0	37.3901
	84.000	17927.00	58815.6	6391223.50	20968581.7	38.5838
	88.000	19630.94	64406.0	6392921.50	20974158.2	39.7606
	92.000	21399.56	70208.5	6394687.37	20979945.2	40.8920
	96.000	23229.69	75212.3	6396512.19	20985932.2	41.9654
	100.000	25117.44	82406.3	6398393.94	20992106.0	42.9735
	104.000	27058.62	98775.0	6400328.44	20998457.7	43.9128
	108.000	29048.62	95303.9	6402311.06	21004957.5	44.7825

Table C-2. Trajectory Tables for the Mission with an Inclination of 55° and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

KDC/HCP I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	ALTITUDE M	ALTITUDE FT	R	RADIUS M	RADIUS FT	INCL DEG
112.000	31082.62	101977.1	6404336.94	21011604.0	45.5846	
116.000	33155.75	109778.7	6406401.12	21018376.2	46.3230	
120.000	35263.25	115693.1	6408498.94	21025258.7	47.0017	
124.000	37400.50	122705.1	6410625.62	21032236.2	47.6254	
128.000	39562.87	129799.5	6412776.50	21039292.7	48.1986	
132.000	41746.19	136962.6	6414947.44	21046415.2	48.7258	
136.000	43946.25	144180.6	6417134.12	21053589.5	49.2097	
140.000	46156.94	151433.5	6419330.50	21060795.5	49.6455	
144.000	48370.62	158696.2	6421528.87	21068008.0	50.0382	
148.000	50580.00	165944.9	6423721.94	21075203.0	50.3935	
152.000	52778.19	173156.8	6425902.87	21082358.2	50.7160	
156.000	54959.06	180311.9	6428065.44	21089453.5	51.0099	
160.000	57116.81	187391.1	6430203.81	21096469.0	51.2785	
164.000	59245.81	194376.0	6432312.50	21103387.2	51.5248	
168.000	61341.25	201250.8	6434386.62	21110192.2	51.7513	
172.000	63398.62	208000.7	6436421.62	21116968.7	51.9602	
176.000	65413.50	214611.2	6438413.06	21123402.2	52.1532	
180.000	67382.12	221070.0	6440357.25	21129780.7	52.3321	
184.000	69300.94	227365.3	6442250.56	21135992.5	52.4982	
188.000	71166.69	233486.5	6444089.81	21142026.7	52.6528	
192.000	72976.50	239424.2	6445872.06	21147874.0	52.7970	
196.000	74727.87	245170.2	6447594.75	21153526.0	52.9317	
197.441	75343.81	247191.0	6448200.12	21155512.0	52.9780	
197.441	75343.81	247191.0	6448200.12	21155512.0	52.9780	
200.000	76406.00	250675.9	6449243.44	21158935.0	52.9777	
204.000	77966.44	255795.4	6450774.31	21163957.5	52.9773	
207.441	79211.19	259870.2	6451993.69	21167958.2	52.9769	
207.441	79211.19	259870.2	6451993.69	21167958.2	52.9769	
209.000	79405.75	259879.2	6451993.69	21167958.2	52.9769	
216.000	82070.06	269259.7	6452184.06	21168582.7	52.9856	
224.000	84518.06	277290.2	6454788.12	2117126.2	53.1079	
232.000	86755.00	284629.3	6457173.56	21184952.5	53.2259	
240.000	88786.62	291294.7	6459345.81	21192070.2	53.3397	
			6461310.37	21198524.7	53.4496	
---SEPARATION						
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Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	ALTITUDE		RADIUS		INCL DEG
	M	FT	M	FT	
248.000	93619.00	297306.4	6463073.31	21204302.5	53.5556
256.000	92258.87	302686.6	6464641.25	21209452.7	53.6580
264.000	93713.00	307457.3	6466020.87	21213979.0	53.7569
272.000	94988.87	311643.3	6467219.62	21217912.0	53.8524
280.000	96094.56	315270.9	6468245.44	2122177.5	53.9446
288.000	97038.87	318369.0	6469106.94	21224104.0	54.0338
296.000	97830.87	320967.4	6469813.19	21226421.0	54.1199
304.000	98480.87	323100.0	6470374.37	21228262.2	54.2032
312.000	98999.81	324802.5	6470801.19	21229662.5	54.2838
320.000	99399.50	326117.8	6471105.44	21230660.7	54.3617
328.000	99692.81	327076.2	6471299.87	21231299.7	54.4370
336.000	99894.12	327736.6	6471398.62	21231622.7	54.5100
344.000	100013.75	328145.5	6471416.87	21231882.5	54.5806
352.000	100023.75	328358.8	6471371.62	21231534.0	54.6490
360.000	100107.87	328437.9	6471281.25	21231237.5	54.7152
368.000	100110.37	328446.1	6471160.94	21230856.0	54.7779
376.000	100107.37	328436.3	6471038.81	21230442.2	54.8357
384.000	100114.50	328459.6	6470918.56	21230047.5	54.8886
392.000	100149.31	328573.9	6470821.59	21229729.7	54.9379
400.000	100230.81	328841.2	6470767.31	21229551.5	54.9832
408.136	100279.87	329002.2	6470762.00	21229534.0	55.0000
408.136	100279.87	329002.2	6470762.00	21229534.0	55.0000

INJECTION

Table C-2. Trajectory Tables for the Mission with an Inclination of 55° and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WDC/4CR 155.0 FUEL 3064K+524K (25K PAYLOAD)

	TIME SEC	MACH	DYN. PRESSURE N/(M)SQ	LB/(FT)SQ	ALFP DEG	DRAG N	LBS
LIFT-OFF	.000	.0000	.000	.000	99.665	56479.958	12637.199
	.000	.0000	.000	.000	99.665	56479.958	12637.199
	4.030	.0497	175.237	3.660	-.009	16452.431	3698.654
	8.000	.1019	727.310	15.190	-.018	65279.934	14675.513
REGIM TILT	3.000	.1019	727.310	15.190	-.018	65279.934	14675.513
	12.000	.1567	1685.302	35.198	-.670	143950.293	32361.312
	16.000	.2143	3062.411	63.960	-.614	247590.584	55660.576
	20.000	.2752	4855.231	101.404	-.301	369134.875	82984.819
END TILT	20.000	.2752	4855.231	101.404	-.301	369134.875	82984.819
	24.000	.3386	7041.098	147.056	.000	499386.707	112266.595
	28.000	.4082	9572.481	200.051	.000	633058.133	142317.127
	32.000	.4812	12399.782	258.975	.000	813632.906	182911.949
	36.000	.5593	15414.485	321.938	.000	1030788.141	231730.387
	40.000	.6430	18512.562	386.645	.000	1329924.859	298978.996
	44.000	.7327	21551.173	450.106	.000	1729047.781	389705.395
	48.000	.8286	24358.630	508.745	.000	2450811.344	550964.297
	52.000	.9299	26710.193	558.042	.000	3334687.781	749667.617
	56.000	1.0373	28509.606	595.436	.000	4288688.937	964135.602
	60.000	1.1534	29755.734	621.463	.000	4587955.250	1031413.344
10 KMS.	62.660	1.2384	30380.855	634.100	.000	4520601.375	1016271.594
	64.000	1.2940	30594.441	638.978	.000	4472190.875	1005388.484
	68.000	1.4314	30960.903	646.632	.000	4257285.687	957075.875
Q MAXIMUM	68.000	1.4314	30960.903	646.632	.000	4257285.687	957075.875
	68.292	1.4392	30961.775	646.650	.000	4243135.812	953894.852
	72.000	1.5934	30624.302	639.604	.000	3919111.500	881051.297
14 KMS.	74.000	1.6329	30126.433	629.205	.000	3596697.875	831050.719
	76.000	1.7663	29471.250	615.520	.000	3471572.750	780440.578
	80.000	1.9439	27480.024	574.101	.000	2950800.531	663366.336
	84.000	2.1130	24681.552	515.485	.000	2479463.187	557405.484
	88.000	2.2844	21810.595	455.691	.000	2073047.719	466039.656
	92.000	2.4657	19140.516	399.946	.000	1709116.031	384224.559
	96.000	2.6591	16709.761	348.970	.000	1388622.172	312174.676
	100.000	2.8663	14509.007	303.027	.000	1110301.734	249605.754
	104.030	3.0879	12541.504	261.935	.000	887704.555	199553.918
	108.000	3.3161	10754.018	224.602	.000	719469.070	161743.078

Table C-2. Trajectory Tables for the Mission with an Inclination of 55° and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MDC/HCR I=55.0 FUEL 30E4K+524K (25K PAYLOAD)

TIME SEC	MACH	DYN. PRESSURE N/(M ² S)	ALFP DEG	N	DRAG	LBS
112.000	3.5470	9137.331	.000	575440.766	129364.228	
115.000	3.7440	7726.994	.000	455486.895	102397.525	
120.000	4.0264	6509.707	.000	357860.445	80450.227	
124.000	4.2742	5470.907	.000	285263.073	64129.677	
128.000	4.5283	4594.418	.000	226222.340	50856.804	
132.000	4.7908	3867.256	.000	178588.275	40148.240	
136.000	5.0638	3253.874	.000	141819.896	31882.380	
140.000	5.3446	2743.972	.000	116410.322	26170.081	
144.000	5.6389	2319.434	.000	95578.048	21486.799	
148.000	5.9408	1984.831	.000	78984.729	17756.473	
152.000	6.2534	1700.981	.000	65068.834	14628.055	
156.000	6.5745	1452.358	.000	53201.723	11960.223	
160.000	7.1575	1235.076	.000	43944.874	9879.200	
164.000	7.5872	1045.850	.000	37212.086	8365.610	
168.000	8.0337	881.757	.000	31373.514	7053.046	
172.000	8.4956	740.200	.000	26336.816	5920.752	
176.000	8.9712	618.837	.000	22018.665	4949.993	
180.000	9.4589	515.460	.000	18340.426	4123.092	
184.000	9.9571	428.006	.000	15228.753	3423.560	
188.000	10.4647	354.535	.000	12614.616	2835.878	
192.000	10.9807	293.227	.000	10433.204	2345.478	
196.000	11.5047	242.388	.000	8624.323	1938.925	
197.441	11.6953	226.342	.000	8053.419	1810.481	
197.441	11.6953	226.342	.000	.000	.000	
200.000	11.7693	192.071	.000	.000	.000	
204.000	11.8804	150.246	.000	.000	.000	
207.441	11.9719	123.064	.000	.000	.000	
207.441	11.9719	123.064	.000	.000	.000	
207.441	11.9719	123.064	.000	10.780	10.777	
208.000	.0000	.000	.000	.000	.000	
216.000	.0000	.000	.000	10.717	.000	
224.000	.0000	.000	.000	10.620	.000	
232.000	.0000	.000	.000	10.488	.000	
240.000	.0000	.000	.000	10.321	.000	

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Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

FEB. 1971

CASE 1

TABLE NO. 4

TIME SEC	MACH	WIND M/SEC	WIND PRESSURE LB/FT ² SQ	ALFP DEG	DRAG N	LBS
298.000	0.000	0.000	0.000	10.122	0.000	0.000
298.000	0.000	0.000	0.000	9.893	0.000	0.000
298.000	0.000	0.000	0.000	9.675	0.000	0.000
298.000	0.000	0.000	0.000	9.349	0.000	0.000
298.000	0.000	0.000	0.000	9.038	0.000	0.000
298.000	0.000	0.000	0.000	8.702	0.000	0.000
298.000	0.000	0.000	0.000	8.344	0.000	0.000
298.000	0.000	0.000	0.000	7.963	0.000	0.000
298.000	0.000	0.000	0.000	7.563	0.000	0.000
298.000	0.000	0.000	0.000	7.144	0.000	0.000
298.000	0.000	0.000	0.000	6.708	0.000	0.000
298.000	0.000	0.000	0.000	6.255	0.000	0.000
298.000	0.000	0.000	0.000	5.787	0.000	0.000
298.000	0.000	0.000	0.000	5.305	0.000	0.000
298.000	0.000	0.000	0.000	4.811	0.000	0.000
298.000	0.000	0.000	0.000	4.309	0.000	0.000
298.000	0.000	0.000	0.000	3.806	0.000	0.000
298.000	0.000	0.000	0.000	3.301	0.000	0.000
298.000	0.000	0.000	0.000	2.794	0.000	0.000
298.000	0.000	0.000	0.000	2.286	0.000	0.000
298.000	0.000	0.000	0.000	2.097	0.000	0.000
298.000	0.000	0.000	0.000	2.087	0.000	0.000

INJECTION

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MDC/HCR I=55.0 FUEL 30F4K+524K (25K PAYLOAD)

	TIME SEC	AZ-S DEG	LATITUDE DEG	LONGITUDE DEG	CHIP DEG	CHIY DEG	CHIR DEG
LIFT-OFF	.000	90.000	29.370	-80.635	.000	.000	37.977
	.000	90.000	28.370	-80.635	.000	.000	37.977
	4.000	89.993	28.370	-80.635	-.009	.000	37.977
	8.000	89.986	29.370	-80.635	-.018	.023	37.977
BEGIN TILT	8.000	89.986	29.370	-80.635	-.018	.000	37.977
	12.000	89.900	28.370	-80.635	-1.397	.000	37.977
	16.000	89.656	29.370	-80.635	-2.794	.000	37.977
	20.000	89.252	28.370	-80.635	-4.191	.000	37.977
END TILT	20.000	89.252	28.370	-80.635	-4.191	.000	37.977
	24.000	88.707	28.370	-80.635	-5.617	.000	37.977
	28.000	87.952	29.371	-80.635	-7.609	.000	37.977
	32.000	86.970	28.371	-80.634	-9.833	.000	37.977
	36.000	85.752	28.372	-80.633	-12.255	.000	37.977
	40.000	84.304	28.374	-80.632	-14.839	.000	37.977
	44.000	82.650	29.376	-80.631	-17.555	.000	37.977
	48.000	80.830	28.378	-80.629	-20.373	.000	37.977
	52.000	78.900	28.381	-80.626	-23.272	.000	37.977
	56.000	76.910	28.385	-80.623	-26.287	.000	37.977
	60.000	74.984	28.389	-90.619	-29.252	.000	37.977
10 KMS.	62.660	73.511	28.393	-80.616	-31.271	.000	37.977
	64.000	72.814	28.395	-80.614	-32.289	.000	37.977
	68.000	70.724	28.401	-80.608	-35.317	.000	37.977
0 MAXIMUM	68.202	70.619	28.402	-80.608	-35.468	.000	37.977
	72.000	68.647	28.409	-80.602	-38.304	.000	37.977
14 KMS.	74.094	67.573	28.413	-80.598	-39.842	.000	37.977
	76.000	66.608	28.418	-80.594	-41.727	.000	37.977
	80.000	64.633	28.428	-90.585	-44.051	.000	37.977
	84.000	62.745	28.440	-80.575	-46.769	.000	37.977
	88.000	60.967	28.453	-80.563	-49.365	.000	37.977
	92.000	59.308	28.468	-80.550	-51.834	.000	37.977
	96.000	57.775	29.485	-80.535	-54.174	.000	37.977
	100.000	56.366	28.504	-80.518	-56.384	.000	37.977
	104.000	55.078	28.525	-90.500	-59.469	.000	37.977
	108.000	53.905	28.549	-80.479	-60.434	.000	37.977

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	47.5 DFG	LATITUDE DFG	LONGITUDE DFG	CHIP DEG	CHIY DEG	CHIR DEG
112.000	52.839	28.575	-80.456	-62.283	.000	37.977
115.000	51.868	28.603	-80.431	-64.024	.000	37.977
120.000	50.687	28.634	-80.403	-65.663	.000	37.977
124.000	50.187	28.668	-80.374	-67.206	.000	37.977
128.000	49.459	28.704	-80.341	-68.659	.000	37.977
132.000	48.796	28.743	-80.306	-70.029	.000	37.977
136.000	48.194	28.786	-80.268	-71.320	.000	37.977
140.000	47.658	28.831	-80.228	-72.539	.000	37.977
144.000	47.180	28.876	-80.184	-73.694	.000	37.977
148.000	46.754	28.931	-80.138	-74.789	.000	37.977
152.000	46.372	28.985	-80.089	-75.831	.000	37.977
156.000	46.028	29.043	-80.037	-76.823	.000	37.977
160.000	45.719	29.104	-79.982	-77.771	.000	37.977
164.000	45.441	29.168	-79.924	-78.676	.000	37.977
168.000	45.189	29.235	-79.863	-79.543	.000	37.977
172.000	44.962	29.305	-79.799	-80.375	.000	37.977
176.000	44.757	29.379	-79.732	-81.173	.000	37.977
180.000	44.571	29.454	-79.663	-81.940	.000	37.977
184.000	44.403	29.534	-79.590	-82.679	.000	37.977
188.000	44.252	29.617	-79.514	-83.391	.000	37.977
192.000	44.115	29.702	-79.434	-84.077	.000	37.977
196.000	43.992	29.791	-79.352	-84.740	.000	37.977
197.441	43.951	29.824	-79.322	-84.973	.000	37.977
197.441	43.951	29.824	-79.322	-84.973	.000	37.977
200.000	43.984	29.882	-79.267	-85.385	.000	37.977
204.000	44.035	29.974	-79.182	-86.031	.000	37.977
207.441	44.079	30.052	-79.109	-86.587	.000	37.977
207.441	44.079	30.052	-79.109	-86.587	.000	37.977
208.000	44.075	30.065	-79.097	-86.587	.000	37.977
216.000	44.022	30.250	-78.923	-87.285	.000	37.977
224.000	43.978	30.442	-78.742	-87.910	.000	37.977
232.000	43.944	30.640	-78.554	-88.501	.000	37.977
241.000	43.918	30.844	-78.359	-89.057	.000	37.977

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Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

	TIME SEC	AZ.S DEG	LATITUDE DEG	LONGITUDE DEG	CHIP DEG	CHIY DEG	CHIR DEG
	249.000	43.902	31.054	-79.156	-80.959	.000	37.977
	256.000	43.894	31.271	-77.945	-81.895	.000	37.977
	264.000	43.896	31.495	-77.725	-82.836	.000	37.977
	272.000	43.907	31.726	-77.499	-83.781	.000	37.977
	280.000	43.928	31.964	-77.262	-84.732	.000	37.977
	288.000	43.959	32.210	-77.016	-85.687	.000	37.977
	296.000	43.999	32.464	-76.759	-86.646	.000	37.977
	304.000	44.049	32.728	-76.493	-87.610	.000	37.977
	312.000	44.110	32.998	-76.215	-88.577	.000	37.977
	320.000	44.181	33.275	-75.925	-89.549	.000	37.977
	328.000	44.263	33.562	-75.623	-90.524	.000	37.977
	336.000	44.357	33.859	-75.308	-91.503	.000	37.977
	344.000	44.463	34.166	-74.979	-92.485	.000	37.977
	352.000	44.581	34.483	-74.635	-93.471	.000	37.977
	360.000	44.712	34.810	-74.275	-94.459	.000	37.977
	368.000	44.859	35.149	-73.899	-95.450	.000	37.977
	376.000	45.024	35.499	-73.505	-96.443	.000	37.977
	384.000	45.207	35.857	-73.094	-97.439	.000	37.977
	392.000	45.409	36.228	-72.665	-98.436	.000	37.977
	400.000	45.629	36.608	-72.217	-99.436	.000	37.977
	403.135	45.721	36.760	-72.036	-99.827	.000	37.977
	403.135	45.721	36.760	-72.036	-99.827	.000	37.977
INJECTION							

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WDC/4CR T-55.0 FUFL 3N64K+524K (25K PAYLOAD)

	TIME SEC	RANGE KM	RANGE ANG. DEG	TOTAL ALPHA DEG	IMP. LAT. DEG	IMP. LONG. DEG
LIFT-OFF						
	.000	.000	.000	.000	28.370	-90.635
	.000	.000	.000	.000	28.370	-80.635
	4.000	.000	.015	.009	28.370	-80.643
	8.000	.000	.029	.018	28.370	-80.637
BEGIN TILT	8.000	.000	.029	.018	28.370	-80.637
	12.000	.002	.044	.070	28.370	-80.636
	16.000	.009	.059	.064	28.370	-80.636
	20.000	.027	.074	.030	28.370	-80.637
END TILT	20.000	.027	.074	.030	28.370	-80.637
	24.000	.062	.089	.091	28.371	-80.635
	28.000	.122	.104	.107	28.373	-80.633
	32.000	.214	.119	.122	28.375	-80.632
	36.000	.349	.134	.135	28.378	-80.629
	40.000	.537	.150	.147	28.388	-80.621
	44.000	.792	.165	.158	28.400	-80.610
	48.000	1.125	.183	.169	28.415	-80.597
	52.000	1.548	.200	.179	28.434	-80.581
	56.000	2.073	.218	.188	28.456	-80.561
	60.000	2.710	.236	.197	28.483	-80.537
10 KMS.	62.000	3.203	.249	.202	28.504	-80.519
	64.000	3.473	.255	.204	28.516	-80.509
	66.000	4.378	.275	.210	28.554	-80.475
0 MAXIMUM	68.202	4.428	.276	.210	28.556	-80.473
	72.000	5.441	.297	.213	28.600	-80.435
14 KMS.	74.034	6.066	.303	.214	28.626	-80.411
	76.000	6.680	.319	.215	28.653	-80.387
	80.000	8.113	.343	.216	29.714	-80.333
	84.000	9.759	.368	.215	28.784	-80.270
	88.000	11.636	.396	.213	28.864	-80.198
	92.000	13.765	.425	.210	28.954	-80.118
	96.000	16.162	.456	.207	29.053	-80.027
	100.000	18.844	.489	.203	29.163	-79.928
	104.000	21.830	.525	.199	29.283	-79.818
	108.000	25.135	.564	.194	29.414	-79.698

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	RANGE KM	RANGE ANG. DEG	TOTAL ALPHA DEG	IMP. LAT. DEG	IMP. LONG. DEG
112.000	28.775	.605	.190	29.554	-79.569
116.000	32.766	.649	.185	29.706	-79.428
120.000	37.123	.696	.180	29.868	-79.277
124.000	41.861	.747	.175	30.041	-79.115
128.000	46.995	.801	.170	30.225	-78.942
132.000	52.541	.859	.165	30.420	-78.757
136.000	58.513	.920	.160	30.627	-78.560
140.000	64.920	.986	.155	30.840	-78.355
144.000	71.766	1.055	.150	31.058	-78.144
148.000	79.052	1.128	.146	31.281	-77.926
152.000	86.781	1.205	.142	31.509	-77.702
156.000	94.954	1.287	.137	31.740	-77.473
160.000	103.572	1.372	.133	31.976	-77.238
164.000	112.637	1.461	.129	32.215	-76.997
168.000	122.151	1.555	.125	32.458	-76.751
172.000	132.113	1.652	.121	32.703	-76.499
176.000	142.526	1.753	.117	32.952	-76.243
180.000	153.389	1.859	.113	33.204	-75.981
184.000	164.704	1.969	.110	33.458	-75.713
188.000	176.471	2.083	.106	33.715	-75.441
192.000	188.691	2.201	.102	33.975	-75.163
196.000	201.364	2.323	.098	34.237	-74.879
197.441	206.039	2.368	.096	34.333	-74.776
SEPARATION	197.441	2.368	.096	34.333	-74.776
200.000	214.396	2.448	.096	34.332	-74.776
204.000	227.451	2.574	.096	34.332	-74.776
207.441	238.674	2.682	.095	34.332	-74.776
ORR. IGNITION	207.441	2.682	.095	34.332	-74.776
BEGIN MIN-H	207.441	2.682	.095	34.332	-74.776
208.000	240.501	2.699	.095	34.332	-74.776
216.000	267.091	2.955	.095	34.332	-74.776
224.000	294.579	3.220	.095	34.332	-74.776
232.000	322.993	3.493	.095	34.332	-74.776
240.000	352.364	3.774	.095	34.332	-74.776

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WJCC/HCR I=55.0 FUFL 3054K+524K (25K PAYLOAD)

TIME SEC	RANGE KM	RANGE ANG. DEG	TOTAL ALPHA DEG	IMP. LAT. DEG	IMP. LONG. DEG
248.000	382.724	4.0165	10.945	35.042	-72.851
256.000	414.105	4.365	10.580	36.418	-72.410
264.000	446.554	4.674	10.399	36.810	-71.943
272.000	480.097	4.994	10.075	37.220	-71.446
280.000	514.791	5.323	9.739	37.651	-70.914
288.000	550.647	5.664	9.380	38.106	-70.342
296.000	587.742	6.015	9.002	38.589	-69.723
304.000	626.115	6.378	8.605	39.104	-69.046
312.000	665.820	6.753	8.191	39.659	-68.298
320.000	706.914	7.141	7.760	40.260	-67.463
328.000	749.456	7.541	7.316	40.922	-66.515
336.000	793.513	7.955	6.858	41.662	-65.416
344.000	839.158	8.384	6.389	42.493	-64.126
352.000	886.467	8.827	5.910	43.479	-62.513
360.000	935.526	9.286	5.423	44.659	-60.445
368.000	986.414	9.762	4.936	46.111	-57.656
376.000	1039.151	10.254	4.455	47.937	-53.664
384.000	1093.737	10.763	3.984	50.384	-47.060
392.000	1150.173	11.289	3.526	53.758	-32.486
400.000	1208.460	11.831	3.087	40.219	-9.390
408.136	1231.810	12.048	2.923	40.219	-9.390
408.136	1231.810	12.048	2.923	40.219	-9.390

INJECTION

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WDC/HCR I=55.0 FUEL 3064K+E24K (25K PAYLOAD)

	TIME SEC	AERO HEATING INDIC.		ALPHA Q M*RAD	LB*DEG	DFS. NODE DEG
		N-M/(MISC)	LB-FI/(FI)SQ			
LIFT-OFF	.000	.0	.0	.000	.000	90.000
	.000	.0	.0	.000	.000	90.000
	4.000	1998.0	130.1	-.027	-.747	90.031
BEGIN TILT	8.000	31908.9	2186.5	-.224	-2.887	90.063
	8.000	31908.9	2186.5	-.224	-2.897	90.063
	12.000	168162.8	11522.8	-19.708	-253.849	90.260
END TILT	16.000	551586.5	37802.5	-37.803	-422.519	90.790
	20.000	1395384.8	95614.2	-25.492	-328.359	91.657
	20.000	1395384.8	95614.2	-25.492	-328.359	91.657
	24.000	2991225.8	204964.1	11.187	144.008	92.821
	29.000	5691159.2	399968.3	17.897	230.570	94.421
	32.000	9916658.6	679507.0	26.334	339.199	96.492
	36.000	16135971.9	1105665.3	36.332	467.978	99.037
	40.000	24840940.5	1702145.1	47.578	612.833	102.023
	44.000	36504618.5	2501360.9	59.602	767.706	105.373
	48.000	51525621.5	3530626.5	71.795	924.772	108.967
IN KMS.	52.000	70111518.0	4804164.9	83.404	1074.298	112.655
	56.000	92251711.8	6321250.1	93.752	1207.585	116.310
	60.000	117773918.0	9070076.7	102.392	1318.870	119.970
	62.660	136574398.0	9358318.9	107.089	1379.375	122.183
	64.000	146502076.0	10045433.0	109.080	1405.019	123.329
Q MAXIMUM	68.000	178686908.0	12243942.2	117.270	1458.986	126.636
	68.202	190386814.0	12360422.9	113.394	1460.591	126.798
	72.000	213728502.0	14645054.2	113.957	1467.834	129.746
	74.000	233042500.0	15968431.5	112.738	1452.130	131.284
	76.000	251073844.0	17204022.7	110.652	1425.267	132.628
IN KMS.	80.000	299743788.0	19853755.7	103.392	1331.747	135.268
	84.000	328517980.0	22510632.0	92.440	1190.680	137.659
	89.000	366104000.0	25086092.2	80.983	1043.105	139.799
	92.000	402243672.0	27562446.5	70.168	903.802	141.703
	96.000	436714169.0	29924425.7	60.253	776.098	143.399
IN KMS.	100.000	469361860.0	32161503.0	51.359	661.531	144.881
	104.000	500081100.0	34256439.5	43.485	560.114	146.199
	108.000	528770960.0	36232319.5	36.460	469.631	147.363

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MOC/HCP 1-55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	AERO HEATING INDIC. N-N/(MISO)	LR-FI/FTISO	N*RAD	ALPHA 0 LB*DEG	DES. NODE DEG
112.000	555225896.0	38045058.5	30.246	389.588	148.395
116.000	579419400.0	39702840.0	24.938	321.212	149.312
120.000	603402780.0	41209178.5	20.457	283.498	150.128
124.000	621274350.0	42570316.0	16.720	215.366	150.859
128.000	639172672.0	43767198.5	13.639	175.682	151.514
132.000	655263640.0	4489921.0	11.124	143.282	152.104
136.000	669730832.0	45891125.0	9.083	116.998	152.635
140.000	682722992.0	46781384.5	7.428	95.671	153.106
144.000	694369448.0	47579420.0	6.091	78.451	153.524
148.000	704843048.0	48237090.0	5.057	65.140	153.898
152.000	714329344.0	48947107.5	4.205	54.169	154.234
156.000	722876952.0	49532805.0	3.484	44.873	154.538
160.000	730528528.0	50057104.5	2.873	37.012	154.814
164.000	737337056.0	50523636.5	2.359	30.385	155.064
168.000	743357768.0	50938186.5	1.927	24.823	155.294
172.000	748649216.0	51298766.0	1.566	20.177	155.505
176.000	753272496.0	51615561.5	1.267	16.321	155.699
180.000	757290088.0	51890854.0	1.020	13.141	155.878
184.000	760764360.0	52178917.0	.818	10.537	156.045
188.000	763756432.0	52339338.5	.654	8.419	156.199
192.000	766324888.0	52509934.0	.521	6.707	156.343
196.000	768524792.0	52660675.0	.414	5.333	156.477
197.441	769236736.0	52709459.0	.381	4.909	156.523
197.441	769236736.0	52709459.0	.381	4.909	156.523
200.000	770369752.0	52787095.0	.322	4.153	156.523
204.000	771811776.0	52985905.5	.251	3.232	156.523
207.441	772802784.0	52953810.5	.205	2.635	156.522
207.441	772802784.0	52953810.5	.205	2.635	156.522
207.441	772802784.0	52953810.5	.205	2.635	156.522
208.000	772802784.0	52953810.5	.000	.000	156.531
216.000	772802784.0	52953810.5	.000	.000	156.655
224.000	772802784.0	52953810.5	.000	.000	156.775
232.000	772802784.0	52953810.5	.000	.000	156.891
240.000	772802784.0	52953810.5	.000	.000	157.004

SEPARATION

ORR IGNITION
BERTN MIN-H

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	AERO HEATING INDIC. N-M/(M)SQ	LB-FT/(FT)SQ	ALPHA °		DFS. NODE DEG
			N*RAD	LB*DEG	
248.000	772802784.0	52953810.5	.000	.000	157.114
256.000	772802784.0	52953810.5	.000	.000	157.221
264.000	772802784.0	52953810.5	.000	.000	157.324
272.000	772802784.0	52953810.5	.000	.000	157.425
280.000	772802784.0	52953810.5	.000	.000	157.524
288.000	772802784.0	52953810.5	.000	.000	157.620
296.000	772802784.0	52953810.5	.000	.000	157.713
304.000	772802784.0	52953810.5	.000	.000	157.805
312.000	772802784.0	52953810.5	.000	.000	157.894
320.000	772802784.0	52953810.5	.000	.000	157.981
328.000	772802784.0	52953810.5	.000	.000	158.067
336.000	772802784.0	52953810.5	.000	.000	158.150
344.000	772802784.0	52953810.5	.000	.000	158.232
352.000	772802784.0	52953810.5	.000	.000	158.312
360.000	772802784.0	52953810.5	.000	.000	158.391
368.000	772802784.0	52953810.5	.000	.000	158.467
376.000	772802784.0	52953810.5	.000	.000	158.538
384.000	772802784.0	52953810.5	.000	.000	158.604
392.000	772802784.0	52953810.5	.000	.000	158.666
400.000	772802784.0	52953810.5	.000	.000	158.724
403.136	772802784.0	52953810.5	.000	.000	158.746
403.136	772802784.0	52953810.5	.000	.000	158.746

INJECTION

Table C-2. Trajectory Tables for the Mission with an Inclination of 55° and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	APOLLO J3			POSITION			COORDINATES		
	M	X	FT	M	Y	FT	M	FT	Z
LIFT-OFF									
0.000	6373293.3	20909754.7		11032.1		36194.5	-14132.3	-46365.8	
0.010	6373293.3	20909754.7		11032.1		36194.5	-14132.3	-46365.8	
4.000	6373327.2	20909865.2		12321.4		40424.6	-13175.7	-43063.2	
8.000	6373431.4	20910207.7		13610.6		44654.2	-12118.8	-39760.0	
8.000	6373431.4	20910207.7		13610.6		44654.2	-12118.8	-39760.0	
12.000	6373608.8	20910790.0		14859.6		48883.3	-11110.9	-36453.1	
16.000	6373862.9	20911523.5		16188.4		53111.6	-10097.2	-33127.2	
20.000	6374196.7	20912718.7		17476.9		57339.0	-9071.8	-29763.1	
24.000	6374613.6	20914086.2		18765.1		61565.4	-8029.2	-26342.5	
28.000	6375116.5	20915736.5		20053.0		65790.8	-6962.5	-22843.0	
32.000	6375708.6	20917679.0		21340.6		70015.0	-5862.9	-19235.2	
36.000	6376392.7	20919921.7		22627.7		74237.9	-4720.1	-15485.9	
40.000	6377168.9	20922470.0		23914.4		78459.3	-3523.0	-11558.3	
44.000	6378039.2	20925325.5		25200.7		82679.3	-2259.5	-7412.9	
48.000	6378902.0	20928484.0		26486.4		86897.7	-917.2	-3009.0	
52.000	6380052.9	20931931.7		27771.7		91114.4	516.0	1692.9	
56.000	6381185.3	20935647.2		29056.4		95329.3	2051.4	6730.4	
60.000	6382391.9	20939606.0		30340.5		99542.2	3700.5	12140.8	
62.000	6383233.5	20942367.0		31193.9		102342.3	4866.4	15965.9	
64.000	6383669.3	20944379.6		31624.0		103753.2	5476.7	17968.3	
66.000	6385016.5	20946216.7		32906.8		107962.0	7395.8	24264.3	
68.000	6385086.2	20948445.5		32971.5		109174.1	7496.6	24595.1	
69.212	6385086.2	20952062.7		34189.0		112169.6	9474.3	31083.7	
72.000	6386432.6	20955384.2		34959.8		114369.4	10631.7	34881.0	
74.000	6387201.2	2095733.5		35470.5		116372.9	11730.1	38484.6	
76.000	6387917.2	20962282.0		36751.2		120574.9	14181.9	46528.5	
80.000	6389469.4	20966137.7		38031.2		124774.2	16849.0	55278.7	
84.000	6391088.4	20973662.0		39310.3		129970.9	19750.5	64798.3	
88.000	6392772.2	20979368.5		40588.7		133164.9	22805.4	75148.8	
92.000	6394517.6	20985375.2		41866.2		137356.1	26331.7	86390.2	
96.000	6396321.1	20991397.5		43142.7		141544.4	30047.5	98581.1	
100.000	6398178.0	20997640.7		44418.4		145729.7	34070.2	111778.8	
104.000	6400083.7	21004044.5		45693.1		149911.8	38416.5	126038.3	
108.000	6402032.6								

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MDC/HCR I-55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	APOLLO 13				POSITION COORDINATES				Z			
	M	X	FT	M	Y	FT	M	FT	M	FT	M	FT
112.000	6404019.7	21010563.2	46966.9	154090.8	43102.7	141413.0						
116.000	6405038.7	21017187.2	48739.6	158266.4	48144.8	157955.4						
120.000	6406083.9	21023897.2	49511.3	162438.6	53558.6	175717.1						
124.000	6410149.7	21030675.0	50781.9	166507.3	59359.7	194749.6						
128.000	6412230.2	21037500.5	52051.4	170772.3	65563.7	215104.0						
132.000	6414319.7	21044356.0	53191.8	174933.7	72186.2	236831.5						
136.000	6416412.7	21051222.7	54587.0	179091.3	79242.8	259983.1						
140.000	6418501.5	21058075.7	55853.1	183245.0	86743.1	284590.2						
144.000	6420576.7	21064884.2	57117.9	187394.7	94690.0	310662.9						
148.000	6422629.5	21071619.0	58381.5	191540.3	103086.3	338209.7						
152.000	6424651.1	21078251.5	59643.8	195811.7	111934.1	367238.0						
156.000	6426633.6	21084755.7	60904.8	199818.9	121235.5	397754.2						
160.000	6428568.9	21091105.2	62164.5	203951.6	130992.1	429764.0						
164.000	6430449.7	21097276.0	63422.8	208079.9	141205.4	463272.2						
168.000	6432268.9	21103244.2	64679.7	212203.7	151876.7	498283.0						
172.000	6434019.4	21108987.2	65935.2	216322.8	163007.0	534800.0						
176.000	6435694.6	21114483.5	67189.2	220437.1	174597.4	572826.2						
180.000	6437288.3	21119712.2	68441.8	224545.7	186649.6	612364.2						
184.000	6438794.2	21124653.0	69692.9	228651.2	199161.2	653416.1						
188.000	6440206.6	21129286.5	70942.4	232750.8	212135.8	695983.6						
192.000	6441519.5	21133594.0	72190.4	236845.2	225572.7	740068.0						
196.000	6442727.5	21137557.7	73436.8	240934.5	239472.3	785670.4						
197.441	6443136.0	21138897.5	73885.2	242405.9	244591.6	802465.7						
197.441	6443136.0	21138897.5	73885.2	242405.9	244591.6	802465.7						
200.000	6443817.3	21141132.7	74681.6	245018.4	253738.8	832476.4						
204.000	6444756.4	21144214.0	75924.7	248096.9	268029.5	879361.7						
207.441	6445441.7	21146462.0	76992.7	252000.7	280316.3	919672.8						
207.441	6445441.7	21146462.0	76992.7	252000.7	280316.3	919672.8						
207.441	6445441.7	21146462.0	76992.7	252000.7	280316.3	919672.8						
208.000	6445542.9	21146794.2	77166.2	253170.0	282315.8	926233.0						
216.000	6446780.9	21150856.0	79644.0	261299.3	311389.7	1021619.9						
224.000	6447620.5	21153610.5	82114.8	269405.5	341377.7	1120005.5						
232.000	6448052.7	21155028.2	84578.3	277488.0	372306.4	1221477.7						
240.000	6448067.7	21155077.5	87034.4	285545.0	404203.9	1326129.3						
SEPARATION												
197.441	6443136.0	21138897.5	73885.2	242405.9	244591.6	802465.7						
200.000	6443817.3	21141132.7	74681.6	245018.4	253738.8	832476.4						
204.000	6444756.4	21144214.0	75924.7	248096.9	268029.5	879361.7						
207.441	6445441.7	21146462.0	76992.7	252000.7	280316.3	919672.8						
207.441	6445441.7	21146462.0	76992.7	252000.7	280316.3	919672.8						
207.441	6445441.7	21146462.0	76992.7	252000.7	280316.3	919672.8						
208.000	6445542.9	21146794.2	77166.2	253170.0	282315.8	926233.0						
216.000	6446780.9	21150856.0	79644.0	261299.3	311389.7	1021619.9						
224.000	6447620.5	21153610.5	82114.8	269405.5	341377.7	1120005.5						
232.000	6448052.7	21155028.2	84578.3	277488.0	372306.4	1221477.7						
240.000	6448067.7	21155077.5	87034.4	285545.0	404203.9	1326129.3						
OPR IGNITION BEGIN MIN-H												

SEPARATION

ORR IGNITION
BEGIN MIN-H

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

470/40R 1255.00 FUFL 3064K+524K (25K PAYLOAD)

TIME SEC	X	APOLLO 13		POSITION		COORDINATES		Z	FT
		Y	FT	M	FT	M	FT		
249.000	6447655.0	21153723.5	89492.8	293579.7	437099.8	1434054.4			
256.000	6446603.3	2115029.2	91923.3	301585.5	471025.2	1545358.2			
264.000	6445500.4	21146654.5	94255.6	309565.6	506013.0	1660147.5			
272.000	6443772.9	21140856.0	96779.6	317518.3	542098.0	1778536.8			
280.000	6441466.8	21133486.7	99195.0	325442.9	579317.3	1900647.2			
288.000	6438746.6	2112496.5	101601.6	333338.6	617710.0	2026607.6			
296.000	6435995.4	2111330.0	103999.2	341204.8	657319.1	2156555.4			
304.000	6431715.4	21101428.5	106387.6	349040.6	698186.3	2290637.5			
312.000	6427396.9	21097227.0	108766.5	356845.5	740362.6	2429011.3			
320.000	6422468.5	21071156.2	111135.8	364618.6	783898.6	2571845.9			
328.000	6416997.0	21053139.5	113495.1	372359.4	828849.9	2719323.7			
336.000	6411807.0	21033093.7	115844.4	380066.9	875276.6	2871642.4			
344.000	6404130.7	21010927.5	118183.4	387740.7	923744.2	3029016.4			
352.000	6396697.7	20986541.0	120511.8	395379.9	972824.1	3191680.0			
360.000	6388554.2	20959823.2	122829.5	402983.8	1024094.8	3359891.0			
368.000	6379664.2	20930656.7	125136.2	410551.8	1077126.8	3533880.5			
376.000	6369935.1	20898933.7	127431.7	418083.1	1131931.4	3713685.5			
384.000	6359514.9	20864650.2	129715.9	425577.1	1188499.7	3899277.2			
392.000	6348192.4	20827402.7	131988.5	433033.1	1246822.5	4090624.8			
400.000	6335966.2	20787389.0	134249.3	440450.3	1306889.6	4287695.5			
408.136	6331970.6	20770900.7	135132.1	443346.8	1330906.7	4366491.8			
413.136	6331970.6	20770900.7	135132.1	443346.8	1330906.7	4366491.8			

INJECTION

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	APOLLO 13 VELOCITY COMPONENTS				ZDOT	
	M/SEC	FT/SEC	M/SEC	FT/SEC	M/SEC	FT/SEC
LIFT-OFF	.000	.000	322.345	1057.564	251.634	825.569
	.000	.000	322.345	1057.564	251.634	825.569
	4.000	17.129	322.312	1057.455	251.690	825.721
	8.000	35.065	322.283	1057.357	251.729	825.883
BEGIN TILT	8.000	35.065	322.283	1057.357	251.729	825.883
	12.000	53.812	322.228	1057.177	252.467	828.305
	16.000	73.359	322.165	1056.971	254.544	835.447
	20.000	93.696	322.094	1056.739	258.301	847.443
END TILT	20.000	93.696	322.094	1056.739	258.301	847.443
	24.000	114.848	321.929	1056.480	263.312	863.886
	28.000	135.773	321.834	1056.196	270.390	887.105
	32.000	159.371	321.732	1055.886	279.857	918.167
	36.000	182.486	321.621	1055.550	292.004	958.019
	40.000	205.901	321.503	1055.188	307.070	1007.448
	44.000	229.231	321.377	1054.801	325.206	1066.949
	48.000	251.943	321.243	1054.387	346.441	1136.618
	52.000	273.214	321.102	1053.948	370.604	1215.892
	56.000	292.648	320.952	1053.484	397.573	1304.374
10 KMS.	60.000	310.572	320.849	1052.993	427.545	1402.707
	62.000	322.240	320.795	1052.653	449.499	1474.735
	64.000	328.094	320.736	1052.477	461.229	1513.219
	66.000	345.441	320.630	1051.936	498.978	1637.068
0 MAXIMUM	68.202	346.311	320.622	1051.908	500.993	1643.679
	72.000	362.616	320.457	1051.369	541.035	1775.048
14 KMS.	74.004	371.543	320.364	1051.063	564.949	1853.180
	76.006	379.633	320.277	1050.777	587.650	1927.986
	80.000	396.462	320.089	1050.160	630.042	2096.593
	84.000	412.949	319.893	1049.517	695.292	2281.141
	88.000	428.793	319.689	1048.850	756.278	2491.225
	92.000	443.777	319.478	1048.157	821.895	2696.506
	96.000	457.738	319.260	1047.440	892.037	2926.631
	100.000	470.642	319.033	1046.607	966.590	3171.227
	104.000	482.082	318.799	1045.930	1045.434	3429.901
	108.000	492.241	318.556	1045.138	1128.393	3702.078

Table C-2. Trajectory Tables for the Mission with an Inclination of 55° and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MDC/HCP I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	APOLLO 13			VELOCITY COMPONENTS			ZDOT	
	XDOT M/SEC	YDOT FT/SEC	ZDOT M/SEC	YDOT FT/SEC	M/SEC	FT/SEC	M/SEC	FT/SEC
112.000	500.977	1643.624	318.309	1044.322	1215.378	3987.461		
116.000	504.270	1667.553	318.053	1043.491	1306.331	4285.864		
120.000	514.118	1686.737	317.789	1042.615	1401.213	4597.154		
124.000	519.520	1701.180	317.518	1041.726	1499.990	4921.228		
128.000	521.491	1710.928	317.239	1040.812	1602.662	5258.078		
132.000	523.058	1716.069	316.954	1039.874	1709.264	5607.823		
136.000	523.111	1716.245	316.660	1038.912	1819.448	5969.316		
140.000	520.884	1718.936	316.360	1037.926	1930.783	6334.549		
144.000	516.359	1694.092	316.052	1036.916	2042.804	6702.111		
148.000	509.645	1672.065	315.737	1035.892	2155.425	7071.604		
152.000	500.842	1643.182	315.415	1034.825	2268.571	7442.819		
156.000	490.041	1607.747	315.085	1033.744	2382.175	7815.536		
160.000	477.329	1566.040	314.748	1032.639	2496.177	8189.558		
164.000	462.785	1519.323	314.405	1031.511	2610.523	8564.709		
168.000	446.483	1464.840	314.054	1030.360	2725.165	8940.831		
172.000	428.493	1405.818	313.696	1029.195	2840.060	9317.781		
176.000	408.880	1341.470	313.330	1027.987	2955.167	9695.429		
180.000	387.704	1271.996	312.958	1026.766	3070.451	10073.659		
184.000	365.023	1197.583	312.579	1025.521	3185.981	10452.364		
188.000	340.890	1118.405	312.193	1024.254	3301.425	10831.446		
192.000	315.355	1034.630	311.799	1022.963	3417.057	11210.815		
196.000	288.466	946.412	311.399	1021.650	3532.751	11590.391		
197.441	278.460	913.581	311.253	1021.171	3574.429	11727.129		
197.441	278.460	913.581	311.253	1021.171	3574.429	11727.129		
200.000	253.838	873.131	310.991	1020.313	3573.454	11723.932		
204.000	215.634	787.460	310.577	1018.953	3571.863	11718.710		
207.441	182.702	599.421	310.215	1017.766	3570.427	11713.999		
207.441	182.703	599.421	310.215	1017.766	3570.427	11713.999		
207.441	182.703	599.421	310.215	1017.766	3570.427	11713.999		
208.000	179.297	588.244	310.156	1017.571	3578.185	11739.453		
216.000	130.032	426.613	309.292	1014.737	3690.824	12109.002		
224.000	79.681	261.420	308.400	1011.811	3806.721	12489.242		
232.000	28.159	92.384	307.480	1008.794	3926.039	12880.706		
240.000	-24.629	-80.799	306.533	1005.696	4048.955	13283.974		

SEPARATION

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BEGIN MIN-H

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	APOLLO 13 VELOCITY COMPONENTS				ZDOT	
	XDOT M/SEC	YDOT FT/SEC	ZDOT M/SEC	FT/SEC	M/SEC	FT/SEC
248.000	-78.778	-258.459	305.558	1002.486	4175.662	13699.678
256.000	-134.400	-440.946	304.555	999.196	4306.369	14128.506
264.000	-191.511	-628.646	303.525	995.815	4441.306	14571.213
272.000	-250.537	-821.972	302.467	992.344	4580.725	15028.625
280.000	-311.316	-1021.378	301.381	988.793	4724.904	15501.654
288.000	-374.099	-1227.360	300.268	985.132	4874.151	15991.309
296.000	-439.053	-1440.462	299.128	981.391	5028.806	16498.708
304.000	-506.359	-1661.283	297.960	977.560	5189.249	17025.095
312.000	-575.221	-1890.499	296.766	973.640	5355.904	17571.863
320.000	-648.864	-2128.819	295.544	969.631	5529.247	18140.576
328.000	-724.540	-2377.100	294.295	965.533	5709.818	18732.997
336.000	-803.533	-2636.263	293.019	961.347	5898.224	19351.129
344.000	-886.163	-2907.360	291.716	957.072	6095.163	19997.253
352.000	-972.797	-3191.590	290.386	952.709	6301.432	20673.989
360.000	-1063.844	-3490.300	289.029	948.259	6517.852	21394.028
368.000	-1159.289	-3803.441	287.646	943.722	6739.978	22112.788
376.000	-1258.677	-4129.519	286.237	939.097	6960.996	22837.915
384.000	-1362.008	-4468.529	284.801	934.387	7180.894	23559.364
392.000	-1463.270	-4820.438	283.339	929.591	7399.585	24276.855
400.000	-1560.449	-5185.201	281.851	924.708	7616.979	24990.087
403.136	-1625.092	-5331.665	281.261	922.773	7701.813	25268.415
403.136	-1625.092	-5331.665	281.261	922.773	7701.813	25268.415

INJECTION

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WDC/4CR 1-55.0 FUEL 3064K+534K (25K PAYLOAD)

APOLLO 13 ACCELERATION COMPONENTS									
TIME	XDDOT		YDDOT		ZDDOT				
SEC	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2			
LIFT-OFF									
0.000	4.155	13.632	-.009	-.029	.011	.037			
0.005	4.155	13.632	-.009	-.029	.011	.037			
0.010	4.393	14.380	-.008	-.026	.012	.039			
0.015	4.586	15.044	-.007	-.023	.013	.042			
0.020	4.586	15.044	-.007	-.023	.013	.042			
0.025	4.787	15.706	-.015	-.048	.033	1.190			
0.030	4.986	16.357	-.017	-.055	.027	2.387			
0.035	5.189	17.008	-.019	-.061	1.103	3.617			
0.040	5.184	17.008	-.019	-.051	1.103	3.617			
0.045	5.386	17.669	-.021	-.068	1.497	4.911			
0.050	5.573	18.295	-.023	-.074	2.056	6.744			
0.055	5.721	18.771	-.025	-.081	2.691	8.627			
0.060	5.827	19.117	-.027	-.087	3.393	11.131			
0.065	5.958	19.218	-.029	-.094	4.145	13.599			
0.070	5.796	19.015	-.031	-.100	4.928	16.168			
0.075	5.517	18.100	-.032	-.107	5.679	18.632			
0.080	5.103	16.741	-.034	-.113	6.397	20.988			
0.085	4.602	15.098	-.036	-.119	7.082	23.233			
0.090	4.399	14.433	-.038	-.126	7.931	26.020			
0.095	4.375	14.353	-.040	-.130	8.583	28.159			
0.100	4.360	14.305	-.040	-.132	8.920	29.265			
0.105	4.314	14.154	-.042	-.139	9.965	32.693			
0.110	4.312	14.147	-.042	-.139	10.019	32.872			
0.115	4.274	14.022	-.044	-.145	11.074	36.331			
0.120	4.253	13.955	-.045	-.148	11.679	38.317			
0.125	4.233	13.889	-.046	-.151	12.243	40.168			
0.130	4.177	13.704	-.048	-.157	13.458	44.155			
0.135	4.052	13.294	-.050	-.164	14.659	48.095			
0.140	3.961	12.668	-.052	-.170	15.830	51.934			
0.145	3.824	11.891	-.054	-.176	16.975	55.691			
0.150	3.750	10.992	-.056	-.183	18.092	59.356			
0.155	3.047	9.997	-.058	-.189	19.180	62.927			
0.160	2.716	8.910	-.059	-.195	20.231	66.376			
0.165	2.363	7.752	-.061	-.201	21.246	69.703			
END TILT									
0.000									
0.005									
0.010									
0.015									
0.020									
0.025									
0.030									
0.035									
0.040									
0.045									
0.050									
0.055									
0.060									
0.065									
0.070									
0.075									
0.080									
0.085									
0.090									
0.095									
0.100									
0.105									
0.110									
0.115									
0.120									
0.125									
0.130									
0.135									
0.140									
0.145									
0.150									
0.155									
0.160									
0.165									
0.170									
0.175									
0.180									
0.185									
0.190									
0.195									
0.200									
0.205									
0.210									
0.215									
0.220									
0.225									
0.230									
0.235									
0.240									
0.245									
0.250									
0.255									
0.260									
0.265									
0.270									
0.275									
0.280									
0.285									
0.290									
0.295									
0.300									
0.305									
0.310									
0.315									
0.320									
0.325									
0.330									
0.335									
0.340									
0.345									
0.350									
0.355									
0.360									
0.365									
0.370									
0.375									
0.380									
0.385									
0.390									
0.395									
0.400									
0.405									
0.410									
0.415									
0.420									
0.425									
0.430									
0.435									
0.440									
0.445									
0.450									
0.455									
0.460									
0.465									
0.470									
0.475									
0.480									
0.485									
0.490									
0.495									
0.500									
0.505									
0.510									
0.515									
0.520									
0.525									
0.530									
0.535									
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0.665									
0.670									
0.675									
0.680									
0.685									
0.690									
0.695									
0.700									
0.705									
0.710									
0.715									
0.720									
0.725									
0.730									
0.735									
0.740									
0.745									
0.750									
0.755									
0.760									
0.765									
0.770									
0.775									
0.780									
0.785									
0.790									
0.795									
0.800									
0.805									
0.810									
0.815									
0.820									
0.825									
0.830									
0.835									
0.840									
0.845									
0.850									
0.855									
0.860									
0.865									
0.870									
0.875									
0.880									
0.885									
0.890									
0.895									
0.900									
0.905									
0.910									
0.915									
0.920									
0.925									
0.930									
0.935									
0.940									
0.945									
0.950									
0.955									
0.960									
0.965									
0.970									
0.975									
0.980									
0.985									
0.990									
0.995									
1.000									

Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

MDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	APOLLO 13 ACCELERATION COMPONENTS					
	XDOOT		YDOOT		ZDOOT	
	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2
112.000	2.004	6.575	-.063	-.207	22.244	72.980
116.000	1.643	5.389	-.065	-.213	23.271	76.216
120.000	1.281	4.203	-.067	-.219	24.209	79.425
124.000	.921	3.021	-.069	-.225	25.180	82.612
128.000	.566	1.857	-.071	-.231	26.157	85.818
132.000	.219	.717	-.072	-.239	27.146	89.062
136.000	-.260	-.854	-.074	-.244	27.740	91.011
140.000	-.849	-2.784	-.075	-.249	27.923	91.612
144.000	-1.409	-4.623	-.078	-.255	28.084	92.138
148.000	-1.944	-6.377	-.080	-.261	28.224	92.598
152.000	-2.454	-8.052	-.081	-.267	28.346	93.000
156.000	-2.943	-9.654	-.083	-.273	28.453	93.350
160.000	-3.410	-11.189	-.085	-.279	28.546	93.654
164.000	-3.859	-12.660	-.087	-.285	28.625	93.915
168.000	-4.289	-14.072	-.089	-.291	28.694	94.140
172.000	-4.703	-15.430	-.090	-.297	28.752	94.330
176.000	-5.101	-16.736	-.092	-.302	28.800	94.489
180.000	-5.484	-17.994	-.094	-.308	28.840	94.621
184.000	-5.854	-19.206	-.096	-.314	28.873	94.727
188.000	-6.211	-20.376	-.097	-.320	28.898	94.810
192.000	-6.555	-21.505	-.099	-.326	28.917	94.871
196.000	-6.888	-22.597	-.101	-.331	28.930	94.913
197.441	-7.005	-22.982	-.102	-.333	28.933	94.924
197.441	-9.583	-31.439	-.102	-.333	28.934	-1.227
200.000	-9.579	-31.427	-.103	-.337	28.937	-1.271
204.000	-9.573	-31.409	-.104	-.343	28.940	-1.340
207.441	-9.569	-31.394	-.106	-.348	28.942	-1.399
207.441	-8.573	-28.126	-.106	-.348	28.945	53.397
207.441	-6.085	-19.964	-.106	-.348	28.947	45.457
208.000	-6.094	-19.993	-.106	-.349	28.948	45.456
216.000	-6.224	-20.421	-.110	-.360	28.950	46.851
224.000	-6.365	-20.883	-.113	-.371	28.952	48.220
232.000	-6.517	-21.382	-.117	-.383	28.954	49.658
240.000	-6.681	-21.920	-.120	-.394	28.957	51.172

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Table C-2. Trajectory Tables for the Mission with an Inclination of 55°
and a Cargo of 11,339.807 kg (25,000 lbs)

(Continued)

WDC/HCR I=55.0 FUEL 3064K+524K (25K PAYLOAD)

TIME SEC	APOLLO 13 ACCELERATION COMPONENTS					
	XDDOT M/SEC**2	YDDOT M/SEC**2	YDDOT FT/SEC**2	YDDOT FT/SEC**2	ZDDOT M/SEC**2	ZDDOT FT/SEC**2
249.000	-5.958	-22.501	-124	-406	16.084	52.769
250.000	-7.050	-23.128	-127	-417	16.598	54.454
251.000	-7.256	-23.805	-131	-428	17.147	56.239
252.000	-7.479	-24.536	-134	-440	17.719	58.133
253.000	-7.713	-25.326	-137	-451	18.332	60.146
254.000	-7.960	-26.181	-141	-462	18.986	62.291
255.000	-8.222	-27.107	-144	-473	19.685	64.594
309.000	-8.560	-28.112	-148	-484	20.434	67.041
312.000	-8.902	-29.205	-151	-496	21.239	69.683
320.000	-9.264	-30.395	-154	-507	22.108	72.532
324.000	-9.561	-31.595	-158	-518	23.047	75.615
336.000	-10.094	-33.118	-161	-529	24.069	78.965
344.000	-10.571	-34.581	-165	-540	25.183	82.620
352.000	-11.096	-36.405	-168	-551	26.404	86.626
359.000	-11.579	-38.312	-171	-562	27.748	91.037
368.000	-12.177	-39.950	-175	-573	27.692	90.854
376.000	-12.670	-41.568	-178	-583	27.559	90.416
384.000	-13.162	-43.183	-181	-594	27.414	89.940
392.000	-13.553	-44.793	-184	-605	27.257	89.427
400.000	-14.142	-46.398	-188	-615	27.089	88.875
407.136	-14.333	-47.023	-189	-620	27.020	88.649
407.136	-14.333	-47.023	-189	-620	27.020	88.649

INJECTION

Table C-2. Trajectory Tables for the Mission with an Inclination of 55° and a Cargo of 11,339.807 kg (25,000 lbs)

(concluded)

I = 55°

ROBOT EXYIDU HCR SHUTTLE									
TIME	.40313563+03 SEC	RANGE	.12318100+07 M	RANGE ANGLE	.12048119+02 DEG				
INERTIAL VELOCITY	.78764173+04 M/SEC	RADIUS	.64707620+07 M	FLIGHT PATH ANGLE	-.60374453-05 DEG				
INCL	.55000002+02 DEG	DES. NODE	.15874600+03 DEG	FLIGHT AZIMUTH	.37976775+02 DEG				
GLAT	.36944769+02 DEG	GLAT	.36760103+02 DEG	LONG	-.72035859+02 DEG				
INERTIAL AZIMUTH	.45720524+02 DEG	C1	.50966422+11 M**2/SEC						
WEIGHT	.31785125+06 LBS	C3	.61163367+08 M**2/SEC**2						
KEPLERIAN ORBITAL PARAMETERS									
ECCENTRICITY	.71000442-02	APOGEE RADIUS	.65632961+07 M	PERIGEE RADIUS	.64707539+07 M				
APOGEE HEIGHT	.99952810+02 NM	PERIGEE HEIGHT	.49994027+02 NM						

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

MDC/PCR I=28.5 FUEL 30F4K+524K (65K PAYLOAD)

	TIME SEC	INFRTIAL M/SEC	VELOCITY FT/SEC	RELATIVE M/SEC	VELOCITY FT/SEC	GAMMA S DEG	GAMMA R DEG
LIFT-OFF	.000	408.933	1341.643	.000	.000	.000	.218
	.000	409.933	1341.643	.000	.000	.000	.218
	4.000	409.287	1342.804	17.068	55.996	2.390	89.839
	8.000	410.414	1346.502	34.938	114.625	4.883	89.837
AFGIN TILT	12.000	413.079	1355.246	53.619	175.916	7.458	89.313
	16.000	418.108	1371.746	73.141	239.963	10.068	87.883
	20.000	425.586	1396.280	93.566	306.974	12.672	86.182
	24.000	435.403	1428.486	114.975	377.214	15.238	84.471
END TILT	28.000	448.235	1470.588	137.476	451.038	17.703	82.491
	32.000	464.310	1523.328	161.154	528.720	20.005	80.276
	36.000	483.748	1587.100	186.070	610.466	22.089	77.860
	40.000	506.561	1661.944	212.269	696.421	23.909	75.279
	44.000	532.579	1747.308	239.652	786.260	25.424	72.564
	48.000	561.462	1842.069	268.001	879.259	26.603	69.746
	52.000	592.522	1943.971	296.726	973.543	27.417	66.847
	56.000	625.330	2051.608	325.704	1068.583	27.883	63.882
	60.000	660.030	2165.452	355.441	1166.146	28.061	60.869
10 KMS.	62.913	687.162	2254.470	378.542	1241.936	28.066	58.658
	64.000	697.748	2289.200	387.561	1271.526	28.046	57.833
	66.000	708.950	2324.377	422.775	1387.058	27.876	54.807
0 MAXIMUM	68.604	745.493	2445.842	428.390	1405.480	27.837	54.353
	72.000	783.861	2571.721	461.482	1514.049	27.568	51.822
14 KMS.	74.399	812.684	2666.285	486.546	1596.278	27.326	50.064
	76.000	832.739	2732.082	504.093	1653.850	27.143	48.907
	80.000	885.810	2906.200	550.959	1807.609	26.620	46.086
	84.000	943.157	3094.349	602.256	1925.904	26.011	43.376
	88.000	1004.600	3295.931	657.867	2158.341	25.329	40.792
	92.000	1070.023	3510.573	717.717	2354.714	24.586	38.338
	96.000	1139.336	3737.980	781.766	2564.848	23.796	36.018
	100.000	1212.461	3977.890	849.952	2788.556	22.972	33.931
	104.000	1289.326	4230.071	922.215	3025.640	22.125	31.773
	108.000	1369.798	4494.088	998.423	3275.667	21.265	29.841

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5°
and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K 165K PAYLOAD

TIME SEC	INERTIAL VELOCITY		RELATIVE VELOCITY		GAMMA S	GAMMA R
	M/SEC	FT/SEC	M/SEC	FT/SEC	DEG	DEG
112.000	1453.843	4769.826	1078.535	3538.501	20.401	28.027
116.000	1543.467	5057.307	1162.546	3814.128	19.541	26.327
120.000	1632.691	5356.598	1250.462	4102.565	18.690	24.733
124.000	1727.539	5667.780	1342.289	4403.835	17.854	23.240
128.000	1826.060	5991.012	1438.058	4718.037	17.037	21.841
132.000	1928.338	6326.569	1537.633	5045.382	16.241	20.531
136.000	2034.292	6674.187	1641.513	5385.542	15.470	19.303
140.000	2141.689	7026.540	1746.843	5731.112	14.720	18.152
144.000	2249.582	7380.519	1852.854	6078.917	13.992	17.071
148.000	2357.988	7736.183	1959.548	6428.962	13.286	16.054
152.000	2466.886	8093.459	2066.887	6781.125	12.603	15.095
156.000	2576.255	8452.279	2174.838	7135.295	11.944	14.191
160.000	2686.075	8812.581	2283.368	7491.365	11.308	13.336
164.000	2796.327	9174.303	2392.448	7849.237	10.695	12.528
168.000	2906.995	9537.385	2502.048	8208.818	10.105	11.762
172.000	3018.060	9901.771	2612.143	8570.022	9.537	11.037
176.000	3129.506	10267.910	2722.707	8932.765	8.992	10.349
180.000	3241.318	10634.247	2833.717	9296.972	8.467	9.696
184.000	3353.480	11002.232	2945.151	9662.568	7.984	9.077
188.000	3465.978	11371.318	3056.987	10029.485	7.481	8.488
192.000	3578.797	11741.459	3169.206	10397.658	7.017	7.929
196.000	3691.923	12112.609	3281.789	10767.024	6.573	7.398
196.988	3719.908	12204.423	3309.648	10858.424	6.466	7.271
196.988	3719.908	12204.423	3309.648	10858.424	6.466	7.271
200.000	3716.743	12194.038	3306.103	10846.793	6.122	6.886
204.000	3712.808	12181.129	3301.695	10832.332	5.665	6.373
206.988	3710.069	12172.143	3298.626	10822.263	5.323	5.989
206.988	3710.069	12172.143	3298.626	10822.263	5.323	5.989
206.988	3710.069	12172.143	3298.626	10822.263	5.323	5.989
208.000	3723.551	12216.374	3312.031	10866.242	5.249	5.904
216.000	3832.239	12572.964	3420.164	11221.009	4.689	5.256
224.000	3944.791	12942.227	3532.241	11588.717	4.166	4.654
232.000	4061.342	13324.612	3648.390	11969.784	3.678	4.095
240.000	4182.045	13720.619	3768.755	12364.682	3.224	3.578

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5°
and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

WDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	INFERTIAL VELOCITY		RELATIVE VELOCITY		GAMMA S DEG	GAMMA R DEG
	M/SEC	FT/SEC	M/SEC	FT/SEC		
248.000	4307.071	14130.810	3893.499	12773.946	2.804	3.102
256.000	4436.611	14555.810	4022.806	13198.181	2.416	2.664
264.000	4570.877	14996.315	4156.881	13638.062	2.058	2.263
272.000	4710.106	15453.105	4295.957	14094.346	1.731	1.898
280.000	4854.562	15927.042	4440.292	14567.887	1.433	1.567
288.000	5004.541	16419.097	4590.177	15059.634	1.163	1.268
296.000	5160.371	16930.351	4745.936	15570.657	.921	1.002
304.000	5322.422	17462.015	4907.938	16102.159	.706	.766
312.000	5491.110	18015.451	5076.593	16655.488	.517	.560
320.000	5666.901	18592.194	5252.365	17232.169	.354	.382
328.000	5850.324	19193.975	5435.781	17833.928	.217	.233
336.000	6041.979	19822.766	5627.440	18462.728	.103	.111
344.000	6242.552	20480.813	5828.021	19120.804	.015	.016
352.000	6452.825	21170.685	6038.309	19810.726	-.050	-.053
360.000	6673.702	21895.348	6259.204	20535.446	-.090	-.096
368.000	6905.648	22656.326	6491.171	21296.493	-.107	-.114
376.000	7140.658	23427.355	6726.202	22067.591	-.107	-.113
384.000	7375.791	24198.789	6961.355	22839.090	-.090	-.095
392.000	7611.000	24970.471	7196.584	23610.839	-.057	-.060
400.000	7846.245	25742.274	7431.847	24382.698	-.007	-.008
401.026	7876.419	25841.270	7462.023	24481.702	-.000	-.000
401.026	7876.419	25841.270	7462.023	24481.702	-.000	-.000

INJECTION

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

	TIME SEC	MASS KGS	WEIGHT LBS	THRUST N	LBS	LONGIT. ACCELERATION	
						M/(SEC)SO	FT/(SEC)SO
LIFT-OFF	.000	2103150.6	4636653.3	29358262.0	6599999.9	13.93	45.71
	.000	2103150.6	4636653.3	29358262.0	6599999.9	13.93	45.71
	4.000	2073145.3	4570503.0	29369544.5	6602536.3	14.16	46.45
	8.000	2043140.0	4504352.6	29404076.0	6610299.3	14.36	47.11
BEGIN TILT	8.000	2043140.0	4504352.6	29404076.0	6610299.3	14.36	47.11
	12.000	2013134.7	4438202.2	29462154.5	6623355.9	14.56	47.87
	16.000	1983129.4	4372051.9	29543709.7	6641690.2	14.77	48.47
	20.000	1953124.1	4305901.6	29647921.0	6665117.8	14.99	49.19
END TILT	20.000	1953124.1	4305901.6	29647921.0	6665117.8	14.99	49.19
	24.000	1923118.8	4239351.2	29773483.7	6693345.4	15.23	49.95
	28.000	1893113.5	4173600.9	29918403.0	6725924.6	15.47	50.77
	32.000	1863108.2	4107450.6	30079990.7	6762251.0	15.71	51.56
	36.000	1833102.9	4041300.2	30255032.2	6801601.9	15.95	52.34
	40.000	1803097.7	3975149.9	30439733.7	6843124.4	16.16	53.02
	44.000	1773092.4	3908999.5	30630034.5	6885905.7	16.32	53.54
	48.000	1743087.1	3842849.2	30821626.5	6928977.3	16.51	53.53
	52.000	1713081.8	3776698.8	31010103.0	6971348.5	16.70	53.15
	56.000	1683076.5	3710548.5	31191310.2	7012085.6	16.83	52.61
10 KMS.	60.000	1653071.2	3644398.2	31361827.7	7050419.4	16.91	53.18
	64.000	1623065.9	3578247.8	31519190.2	7085795.9	17.00	53.67
	68.000	1593060.6	3512097.5	31661934.0	7117886.0	17.19	56.41
Q MAXIMUM	68.604	1588526.1	3502100.7	31682088.2	712216.8	17.28	56.70
	72.000	1563055.3	3445947.2	31788115.5	7146252.7	17.81	58.44
14 KMS.	74.399	1545059.3	3406272.7	3185531.2	7161372.4	18.23	59.80
	76.000	1533050.0	3379796.8	31896667.5	7170656.2	18.52	60.75
	80.000	1503044.8	3313646.5	31987273.5	7191025.2	19.29	63.28
	84.000	1473039.5	3247496.1	32060345.2	7207452.4	20.05	65.77
	88.000	1443034.2	3181345.8	32116793.2	7220142.4	20.79	68.21
	92.000	1413028.9	3115195.5	32160364.0	7229937.5	21.52	70.61
	96.000	1383023.6	3049045.1	32193614.0	7237412.4	22.25	72.99
100.000	100.000	1353018.3	2982894.8	32218803.2	7243075.2	22.97	75.35
	104.000	1323013.0	2916744.4	32237798.0	7247345.4	23.68	77.68
	108.000	1293007.7	2850594.1	32252113.0	7250563.5	24.37	79.95

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K*524K (65K PAYLOAD)

TIME SEC	MA* KGS	WEIGHT LBS	THRUST N	LBS	M/(SEC)SQ FT/(SEC)SQ	ACCELERATION FT/(SEC)SQ
112.000	1253002.4	278443.7	32262830.2	7252972.8	25.07	82.25
116.000	1232997.2	2718293.4	32270799.5	7254764.4	25.79	84.60
120.000	1202991.9	2652143.1	32276715.0	7256094.2	26.52	87.01
124.000	1172986.6	2585992.7	32281099.5	7257079.9	27.27	89.45
128.000	1142981.3	2519842.4	32284349.0	7257810.4	28.04	91.99
132.000	1112976.0	2453692.1	32286759.2	7258352.2	28.84	94.62
136.000	1083016.9	2397543.5	32012493.7	7196594.9	29.42	96.52
140.000	1053674.4	2322954.3	31122811.2	6996696.4	29.42	96.52
144.000	1025155.9	2260081.8	30262036.5	6803176.5	29.42	96.52
148.000	997425.3	2198946.3	29428850.0	6615823.7	29.42	96.52
152.000	970457.5	2139492.6	28620793.2	6434210.3	29.42	96.52
156.000	944229.7	2081670.1	27836780.7	6257957.3	29.42	96.52
160.000	918719.9	2025470.6	27076286.2	6086991.3	29.42	96.52
164.000	893905.7	1970724.8	26339330.7	5921294.7	29.42	96.52
168.000	869746.9	1917507.7	25622945.0	5760267.2	29.42	96.52
172.000	846784.3	1865737.6	24926780.2	5603763.1	29.42	96.52
176.000	823439.6	1815373.7	24250109.2	5451641.4	29.42	96.52
180.000	801215.0	1766376.6	23592330.5	5303766.9	29.42	96.52
184.000	779593.0	1718708.3	22952863.0	5160008.9	29.42	96.52
188.000	758556.9	1672331.6	22331145.0	5020241.1	29.42	96.52
192.000	739090.4	1627210.8	21726635.7	4884342.1	29.42	96.52
196.000	718177.9	1583311.2	21138811.7	4752193.9	29.42	96.52
198.988	713343.6	1572653.4	20996147.2	4720121.7	29.42	96.52
SEPARATION	388952.5	857493.4	.0	.0	.00	.00
200.000	388952.5	857493.4	.0	.0	.00	.00
204.000	388952.5	857493.4	.0	.0	.00	.00
206.988	388952.5	857493.4	.0	.0	.00	.00
ORB IGNITION	388952.5	857493.4	6389081.7	1436322.7	16.43	53.89
BEGIN MIN-H	388952.5	857493.4	5613531.1	1261972.0	14.43	47.35
206.988	388952.5	857493.4	5613531.1	1261972.0	14.48	47.50
208.000	387687.8	854705.3	5613531.1	1261972.0	14.86	48.76
216.000	377691.8	832667.9	5613531.1	1261972.0	15.27	50.09
224.000	367695.8	810630.5	5613531.1	1261972.0	15.69	51.49
232.000	357699.8	788593.1	5613531.1	1261972.0	16.14	52.97
240.000	347703.8	766555.7	5613531.1	1261972.0		

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5°
and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/MCR I-28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	MASS KGS	WEIGHT LBS	THRUST N	LBS	LONGIT. ACCELERATION M/(SEC)SQ FT/(SEC)SQ
248.000	337707.8	744518.3	5613531.1	1261972.0	16.62
256.000	327711.8	722480.9	5613531.1	1261972.0	17.13
264.000	317715.8	700443.5	5613531.1	1261972.0	17.67
272.000	307719.8	678406.1	5613531.1	1261972.0	18.24
280.000	297723.8	656368.7	5613531.1	1261972.0	18.85
288.000	287727.8	634331.3	5613531.1	1261972.0	19.51
296.000	277731.8	612293.9	5613531.1	1261972.0	20.21
304.000	267735.8	590256.5	5613531.1	1261972.0	20.97
312.000	257739.8	568219.1	5613531.1	1261972.0	21.78
320.000	247743.8	546181.7	5613531.1	1261972.0	22.66
328.000	237747.8	524144.3	5613531.1	1261972.0	23.61
336.000	227751.8	502106.9	5613531.1	1261972.0	24.65
344.000	217755.8	480069.5	5613531.1	1261972.0	25.78
352.000	207759.9	458032.1	5613531.1	1261972.0	27.02
360.000	197763.9	435994.7	5613531.1	1261972.0	28.39
368.000	187767.3	414011.2	5524840.6	1262033.6	29.42
376.000	178207.7	392880.8	5242862.8	1178642.5	29.42
384.000	169112.1	372828.4	4975270.1	1118485.2	29.42
392.000	160480.7	353799.5	4721335.2	1061398.4	29.42
400.000	152289.9	335741.7	4480360.9	1007225.2	29.42
401.026	151270.0	333493.4	4450356.8	1000480.0	29.42
401.026	151270.0	333493.4	4450356.8	1000480.0	29.42
INJECTION					

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

	TIME SEC	ALTITUDE		RADIUS		INCL DEG
		M	FT	M	FT	
LIFT-OFF	0.000	-0.19	-0.6	6373318.44	20909837.2	28.3698
	0.000	-0.19	-0.6	6373318.44	20909837.2	28.3698
	4.000	33.69	110.5	6373352.31	20909948.5	28.3698
	8.000	137.44	450.9	6373456.06	20910288.7	28.3698
BEGIN TILT	8.000	137.44	450.9	6373456.06	20910288.7	28.3698
	12.000	314.19	1030.8	6373532.81	20910868.7	28.3698
	16.000	567.37	1861.5	6373886.00	20911699.2	28.3698
	20.000	899.94	2952.6	6374218.56	20912790.5	28.3698
END TILT	20.000	899.94	2952.6	6374218.56	20912790.5	28.3698
	24.000	1315.25	4315.1	6374633.87	20914153.0	28.3698
	28.000	1816.50	5959.6	6375135.12	20915797.5	28.3699
	32.000	2406.50	7895.3	6375725.12	20917733.2	28.3700
	36.000	3087.87	10130.8	6376406.50	20919968.7	28.3702
	40.000	3862.19	12671.2	6377180.87	20922509.2	28.3706
	44.000	4730.19	15519.0	6378048.87	20925357.0	28.3713
	48.000	5690.69	18670.2	6379009.37	20928508.2	28.3722
	52.000	6739.69	22111.8	6380058.44	20931950.0	28.3735
	56.000	7870.69	25822.5	6381189.56	20935661.2	28.3751
	60.000	9076.94	29780.0	6382395.81	20939618.7	28.3771
10 KMS.	52.913	3999.94	32808.2	6383318.87	20942647.0	28.3787
	64.000	10354.00	33969.8	6383672.84	20943808.7	28.3794
	68.000	11701.06	38389.3	6385020.12	20948228.5	28.3821
Q MAXIMUM	68.604	11910.56	39076.6	6385229.69	20948916.2	28.3825
	72.000	13117.50	43038.4	6386436.75	20952876.2	28.3851
14 KMS.	74.399	14000.00	45931.8	6387319.31	20955771.7	28.3870
	76.000	14602.69	47909.1	6387922.06	20957749.5	28.3883
	80.000	16156.19	53005.9	6389475.75	20962846.7	28.3918
	84.000	17777.12	58323.9	6391096.87	20968165.5	28.3955
	88.000	19464.00	63858.3	6392784.00	20973700.7	28.3993
	92.000	21214.00	69599.7	6394534.25	20979443.0	28.4031
	96.000	23023.81	75537.4	6396394.37	20985381.7	28.4070
	100.000	24889.62	81658.9	6398210.56	20991504.2	28.4107
	104.000	26807.25	87950.3	6400128.56	20997797.0	28.4144
	108.000	28771.94	94396.1	6402093.75	21004244.5	28.4180

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K*524K (65K PAYLOAD)

TIME SEC	ALTITUDE		RADIUS		INCL DEG
	M	FT	M	FT	
112.000	30779.00	100981.0	6404101.31	21010831.0	28.4214
116.000	32823.56	107688.9	6406146.44	21017540.7	28.4247
120.000	34901.00	114504.6	6408224.44	21024358.2	28.4279
124.000	37006.31	121411.8	6410330.44	21031267.7	28.4309
128.000	39135.31	128396.7	6412460.19	21038255.0	28.4338
132.000	41283.37	135444.1	6414609.06	21045305.2	28.4366
136.000	43446.81	142542.0	6416773.44	21052406.2	28.4392
140.000	45620.19	149672.5	6418947.75	21059539.7	28.4417
144.000	47796.00	156811.0	6421124.56	21066681.5	28.4440
148.000	49967.00	163933.7	6423296.75	21073808.0	28.4462
152.000	52126.69	171019.3	6425457.62	21080897.5	28.4482
156.000	54288.75	178047.1	6427601.00	21087929.7	28.4502
160.000	56387.50	184998.4	6429721.17	21094885.5	28.4520
164.000	58477.75	191856.1	6431812.87	21101748.0	28.4537
168.000	60534.37	198503.6	6433871.19	21108501.0	28.4554
172.000	62553.31	205227.4	6435891.75	21115130.2	28.4569
176.000	64530.12	211713.0	6437870.44	21121622.0	28.4584
180.000	66461.25	218048.7	6439803.50	21127964.0	28.4598
184.000	68343.31	224223.5	6441687.56	21134145.5	28.4612
188.000	70173.06	230226.6	6443519.50	21140155.7	28.4625
192.000	71947.75	236049.0	6445296.50	21145985.7	28.4638
196.000	73665.12	241683.5	6447016.31	21151628.2	28.4650
196.988	74080.12	243045.0	6447431.94	21152991.7	28.4653
SEPARATION	74080.12	243045.0	6447431.94	21152991.7	28.4653
200.000	75306.06	247067.1	6448659.75	21157020.0	28.4654
204.000	76829.19	252064.3	6450185.50	21162025.7	28.4655
206.988	77889.00	255541.3	6451247.25	21165509.2	28.4655
ORB IGNITION	77889.00	255541.3	6451247.25	21165509.2	28.4655
BEGIN MIN-H	77889.00	255541.3	6451247.25	21165509.2	28.4655
208.000	78234.87	256676.1	6451593.81	21166646.2	28.4657
216.000	80844.87	265239.1	6454209.31	21175227.2	28.4669
224.000	83237.87	273090.1	6456608.31	21183098.0	28.4682
232.000	85419.50	280247.7	6458796.25	21190276.2	28.4694
240.000	87395.44	286730.4	6460778.94	21196781.2	28.4707

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	ALTITUDE		RADIUS		INCL	
	M	FT	M	FT	DEG	DEG
248.000	89171.19	292556.4	6462562.00	21202631.0	28.4720	28.4720
256.000	90753.62	297748.1	6464152.19	21207848.2	28.4733	28.4733
264.000	92149.37	302327.3	6465556.25	21212454.7	28.4746	28.4746
272.000	93365.69	306317.9	6466781.37	21216474.2	28.4759	28.4759
280.000	94410.19	309744.7	6467835.37	21219932.2	28.4773	28.4773
288.000	95291.37	312635.7	6468726.69	21222856.5	28.4787	28.4787
296.000	96018.06	315019.9	6469464.19	21225276.0	28.4800	28.4800
304.000	96600.06	316929.3	6470057.62	21227223.0	28.4815	28.4815
312.000	97047.50	318397.3	6470517.44	21228731.5	28.4829	28.4829
320.000	97371.87	319461.5	6470854.87	21229838.7	28.4843	28.4843
328.000	97585.31	320161.8	6471082.37	21230585.0	28.4858	28.4858
336.000	97701.25	320542.2	6471213.25	21231014.5	28.4873	28.4873
344.000	97734.12	320650.0	6471262.06	21231174.5	28.4889	28.4889
352.000	97699.69	320537.0	6471244.69	21231117.5	28.4904	28.4904
360.000	97615.50	320260.8	6471178.75	21230901.2	28.4920	28.4920
368.000	97500.62	31983.9	6471083.31	21230588.2	28.4936	28.4936
376.000	97373.50	319466.9	6470977.00	21230239.2	28.4952	28.4952
384.000	97250.56	319063.5	6470876.19	21229904.5	28.4968	28.4968
392.000	97149.06	318730.5	6470798.31	21229653.0	28.4983	28.4983
400.000	97088.00	318530.2	6470762.31	21229535.0	28.4998	28.4998
408.000	97080.19	318517.7	6470761.87	21229533.5	28.5000	28.5000
401.026	97084.19	318517.7	6470761.87	21229533.5	28.5000	28.5000

INJECTION

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	MACH	DYN. PRESSURE N/(M)SQ	ALFP DEG	N	DRAG LBS
LIFT-OFF	.000	.0000	.000	56479.958	12697.199
	.000	.0000	.000	56479.958	12697.199
4.000	.0492	171.870	3.590	16142.930	3629.075
8.000	.1009	713.557	14.903	64100.644	14410.398
BEGIN TILT	.1009	713.557	14.903	64100.644	14410.398
12.000	.1552	1654.043	34.545	141475.047	31804.855
16.000	.2123	3006.914	62.801	243584.158	54759.896
20.000	.2726	4769.721	99.618	363604.629	81741.570
24.000	.3365	6921.181	144.552	492608.707	110742.840
28.000	.4044	9421.549	196.773	622916.984	140037.305
32.000	.4768	12206.511	254.938	801300.711	180139.561
36.000	.5542	15188.280	317.214	1013872.930	227927.697
40.000	.6372	18261.063	381.390	1302005.906	292702.562
44.000	.7263	21285.446	444.556	1694849.562	381017.328
48.000	.8215	24099.350	503.325	2383907.812	535923.781
52.000	.9223	26484.214	553.134	3256828.156	732164.078
56.000	1.0290	28315.653	591.385	4203591.750	945005.000
60.000	1.1442	29595.712	618.119	4567964.250	1026919.195
64.000	1.2367	30275.013	632.307	4511132.000	1014142.797
68.000	1.2734	30472.087	636.423	4473327.062	1005643.906
72.000	1.2701	30393.564	645.260	4270148.000	959967.437
76.000	1.2367	30102.917	628.712	4228784.937	950668.648
80.000	1.1752	29578.437	617.759	3944713.531	886806.859
84.000	1.0929	27694.717	578.416	3694986.594	830666.008
88.000	1.0044	25119.838	524.639	3508969.344	788847.672
92.000	0.9201	22137.709	462.356	2996599.875	673662.437
96.000	0.8428	17042.178	355.933	2530314.594	568837.336
100.000	0.7886	14839.729	309.934	2113412.500	475114.020
104.000	0.7505	12866.077	268.714	1747976.687	392980.781
108.000	0.7296	11079.230	231.395	1425162.547	320389.277
				1143930.719	257165.850
				914839.477	205664.092
				744704.516	167416.230

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

WDC/HCR I-28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	MACH	DYN. PRESSURE N/(M)SQ	ALFP LB/(FT)SQ	DRAG N	LBS
112.000	3.5282	9447.497	197.315	597997.344	134435.146
116.000	3.7650	8019.189	167.484	475299.121	106851.490
120.000	4.0074	6781.461	141.634	374272.520	84139.808
124.000	4.2552	5720.938	119.484	299542.590	67339.852
128.000	4.5091	4821.948	100.708	238483.359	53613.191
132.000	4.7709	4067.750	84.957	189013.373	42491.896
136.000	5.0432	3439.211	71.829	150191.518	33764.396
140.000	5.3233	2911.281	60.803	123765.159	27823.514
144.000	5.6146	2469.315	51.573	102002.272	22931.022
148.000	5.9416	2113.541	44.142	84449.386	18984.977
152.000	6.3090	1820.696	38.026	69982.570	15732.707
156.000	6.6959	1563.374	32.652	57591.582	12947.084
160.000	7.1015	1337.661	27.938	47594.913	10699.762
164.000	7.5251	1140.213	23.814	40569.590	9120.406
168.000	7.9654	968.175	20.221	34448.344	7744.296
172.000	8.4211	818.924	17.104	29137.899	6550.460
176.000	8.8905	690.169	14.414	24556.689	5520.563
180.000	9.3721	579.732	12.108	20627.260	4637.192
184.000	9.8644	485.593	10.142	17277.752	3884.193
188.000	10.3661	405.866	8.477	14440.985	3246.463
192.000	10.8761	338.761	7.075	12053.367	2709.705
196.000	11.3936	282.607	5.902	10055.366	2260.536
196.998	11.5226	270.248	5.644	9615.618	2161.677
196.988	11.5226	270.248	5.644	.000	.000
200.000	11.6061	224.296	4.685	.000	.000
204.000	11.7115	177.127	3.699	.000	.000
206.998	11.7865	149.852	3.130	.000	.000
206.988	11.7865	149.852	3.130	.000	.000
206.988	11.7865	149.852	3.130	10.749	.000
208.000	.0000	.000	.000	10.739	.000
216.000	.0000	.000	.000	10.647	.000
224.000	.0000	.000	.000	10.520	.000
232.000	.0000	.000	.000	10.360	.000
240.000	.0000	.000	.000	10.169	.000

SEPARATION

ORB IGNITION
BEGIN MIN-H

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 30E4K+524K (65K PAYLOAD)

TIME SEC	MACH	DYN. PRESSURE N/4M150	LB/4F1150	ALFP DEG	DRAG N	LBS
248.000	.0000	.000	.000	9.949	.000	.000
256.000	.0000	.000	.000	9.699	.000	.000
264.000	.0000	.000	.000	9.423	.000	.000
272.000	.0000	.000	.000	9.121	.000	.000
280.000	.0000	.000	.000	8.796	.000	.000
288.000	.0000	.000	.000	8.447	.000	.000
296.000	.0000	.000	.000	8.077	.000	.000
304.000	.0000	.000	.000	7.687	.000	.000
312.000	.0000	.000	.000	7.277	.000	.000
320.000	.0000	.000	.000	6.850	.000	.000
328.000	.0000	.000	.000	6.407	.000	.000
336.000	.0000	.000	.000	5.948	.000	.000
344.000	.0000	.000	.000	5.475	.000	.000
352.000	.0000	.000	.000	4.990	.000	.000
360.000	.0000	.000	.000	4.492	.000	.000
368.000	.0000	.000	.000	3.985	.000	.000
376.000	.0000	.000	.000	3.474	.000	.000
384.000	.0000	.000	.000	2.951	.000	.000
392.000	.0000	.000	.000	2.446	.000	.000
400.000	.0000	.000	.000	1.931	.000	.000
401.026	.0000	.000	.000	1.865	.000	.000
401.026	.0000	.000	.000	1.865	.000	.000
INJECTION						

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5°
and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

	TIME SEC	AZ-S DEG	LATITUDE DEG	LONGITUDE DEG	CHIP DEG	CHIY DEG	CHIR DEG
LIFT-OFF	0.000	90.000	28.370	-80.635	0.000	0.000	92.471
	0.000	90.000	28.370	-80.635	0.000	0.000	92.471
	4.000	89.993	28.370	-80.635	-0.015	0.001	92.471
	8.000	89.986	28.370	-80.635	-0.029	0.001	92.471
BEGIN TILT	8.000	89.986	28.370	-80.635	-0.029	0.000	92.471
	12.000	89.983	28.370	-80.635	-0.043	0.000	92.471
	16.000	89.989	28.370	-80.635	-2.806	0.000	92.471
	20.000	90.003	28.370	-80.635	-4.209	0.000	92.471
END TILT	20.000	90.003	28.370	-80.635	-4.209	0.000	92.471
	24.000	90.025	28.370	-80.635	-5.623	0.000	92.471
	28.000	90.059	28.370	-80.634	-7.619	0.000	92.471
	32.000	90.105	28.370	-80.633	-9.850	0.000	92.471
	36.000	90.164	28.370	-80.632	-12.281	0.000	92.471
	40.000	90.235	28.370	-80.630	-14.879	0.000	92.471
	44.000	90.317	28.370	-80.628	-17.611	0.000	92.471
	48.000	90.408	28.370	-80.624	-20.446	0.000	92.471
	52.000	90.505	28.369	-80.620	-23.384	0.000	92.471
	56.000	90.606	28.369	-80.615	-26.348	0.000	92.471
	60.000	90.709	28.369	-80.608	-29.382	0.000	92.471
	64.000	90.815	28.369	-80.603	-32.508	0.000	92.471
0 MAXIMUM	68.000	90.923	28.368	-80.591	-35.488	0.000	92.471
	72.000	91.031	28.368	-80.581	-38.497	0.000	92.471
	76.000	91.095	28.368	-80.573	-40.271	0.000	92.471
	80.000	91.138	28.367	-80.568	-41.438	0.000	92.471
14 KMS.	84.000	91.244	28.367	-80.553	-44.287	0.000	92.471
	88.000	91.348	28.366	-80.537	-47.026	0.000	92.471
	92.000	91.449	28.365	-80.518	-49.642	0.000	92.471
	96.000	91.546	28.365	-80.496	-52.130	0.000	92.471
104 KMS.	100.000	91.640	28.364	-80.472	-54.486	0.000	92.471
	104.000	91.730	28.362	-80.445	-56.712	0.000	92.471
	108.000	91.816	28.361	-80.414	-58.811	0.000	92.471
	112.000	91.900	28.360	-80.381	-60.787	0.000	92.471

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR 1:28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	AZ'S DEG	LATITUDE DEG	LONGITUDE DEG	CHIP DEG	CHIV DEG	CHIR DEG
112.000	91.980	28.358	-80.344	-62.648	.000	92.471
115.000	92.058	28.356	-80.304	-64.398	.000	92.471
120.000	92.134	28.354	-80.259	-66.046	.000	92.471
124.000	92.208	28.352	-80.211	-67.596	.000	92.471
128.000	92.280	28.350	-80.159	-69.056	.000	92.471
132.000	92.352	28.347	-80.103	-70.430	.000	92.471
136.000	92.423	28.344	-80.042	-71.726	.000	92.471
140.000	92.493	28.341	-79.977	-72.949	.000	92.471
144.000	92.563	28.338	-79.908	-74.106	.000	92.471
148.000	92.632	28.334	-79.834	-75.203	.000	92.471
152.000	92.701	28.330	-79.755	-76.245	.000	92.471
156.000	92.770	28.326	-79.672	-77.238	.000	92.471
160.000	92.840	28.322	-79.585	-78.184	.000	92.471
164.000	92.910	28.317	-79.493	-79.089	.000	92.471
168.000	92.981	28.312	-79.396	-79.954	.000	92.471
172.000	93.053	28.306	-79.295	-80.783	.000	92.471
176.000	93.126	28.300	-79.189	-81.579	.000	92.471
180.000	93.200	28.294	-79.079	-82.344	.000	92.471
184.000	93.276	28.288	-78.964	-83.080	.000	92.471
188.000	93.353	28.281	-78.844	-83.788	.000	92.471
192.000	93.431	28.273	-78.720	-84.472	.000	92.471
196.000	93.511	28.266	-78.591	-85.131	.000	92.471
196.988	93.531	28.264	-78.559	-85.290	.000	92.471
196.988	93.531	28.264	-78.559	-85.290	.000	92.471
200.000	93.585	28.258	-78.459	-85.775	.000	92.471
204.000	93.656	28.249	-78.327	-86.419	.000	92.471
206.988	93.709	28.243	-78.229	-86.901	.000	92.471
206.988	93.709	28.243	-78.229	-86.901	.000	92.471
206.988	93.709	28.243	-78.229	-86.901	.000	92.471
208.000	93.728	28.241	-78.195	-86.933	.000	92.471
216.000	93.881	28.223	-77.926	-87.853	.000	92.471
224.000	94.038	28.204	-77.648	-88.779	.000	92.471
232.000	94.199	28.184	-77.360	-89.710	.000	92.471
240.000	94.364	28.162	-77.064	-90.646	.000	92.471

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483,504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	A7.S DEG	LATITUDE DEG	LONGITUDE DEG	CHIP DEG	CHIY DEG	CHIR DEG
248.000	94.534	28.139	-76.757	-81.588	.000	92.471
256.000	94.707	28.114	-76.441	-82.536	.000	92.471
264.000	94.886	28.087	-76.114	-83.488	.000	92.471
272.000	95.069	28.058	-75.776	-84.446	.000	92.471
280.000	95.257	28.028	-75.427	-85.409	.000	92.471
288.000	95.449	27.995	-75.067	-86.376	.000	92.471
296.000	95.648	27.961	-74.694	-87.348	.000	92.471
304.000	95.851	27.923	-74.310	-88.325	.000	92.471
312.000	96.060	27.884	-73.912	-89.306	.000	92.471
320.000	96.275	27.841	-73.501	-90.291	.000	92.471
328.000	96.496	27.796	-73.076	-91.280	.000	92.471
336.000	96.724	27.747	-72.637	-92.273	.000	92.471
344.000	96.958	27.696	-72.182	-93.270	.000	92.471
352.000	97.198	27.640	-71.712	-94.269	.000	92.471
360.000	97.446	27.581	-71.225	-95.272	.000	92.471
368.000	97.701	27.517	-70.721	-96.278	.000	92.471
376.000	97.964	27.450	-70.199	-97.286	.000	92.471
384.000	98.234	27.377	-69.659	-98.296	.000	92.471
392.000	98.511	27.300	-69.101	-99.308	.000	92.471
400.000	98.795	27.218	-68.526	-100.322	.000	92.471
401.026	98.832	27.207	-68.451	-100.452	.000	92.471
401.026	98.832	27.237	-68.451	-100.452	.000	92.471

INJECTION

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5°
and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

	TIME SEC	RANGE KM	RANGE ANG. DEG	TOTAL ALPHA DEG	IMP. LAT. DEG	IMP. LONG. DEG
LIFT-OFF	.000	.000	.000	.000	28.370	-80.635
	.000	.000	.000	.000	28.370	-80.635
	4.000	.000	.015	-.015	28.370	-80.643
BEGIN TILT	8.000	.000	.029	-.029	28.370	-80.637
	8.000	.000	.029	-.029	28.370	-80.637
	12.000	.001	.044	-.683	28.370	-80.637
	16.000	.007	.059	-.629	28.370	-80.635
	20.000	.024	.074	-.314	28.370	-80.636
END TILT	20.000	.024	.074	-.314	28.370	-80.636
	24.000	.058	.089	-.006	28.370	-80.634
	24.000	.058	.089	-.006	28.370	-80.632
	28.000	.116	.104	.008	28.370	-80.629
	32.000	.205	.119	.009	28.370	-80.625
	36.000	.337	.135	.011	28.370	-80.611
	40.000	.522	.152	.013	28.369	-80.594
	44.000	.772	.169	.016	28.368	-80.573
	48.000	1.100	.186	.018	28.367	-80.547
	52.000	1.517	.205	.021	28.366	-80.514
	56.000	2.036	.224	.024	28.365	-80.476
	60.000	2.667	.245	.027	28.363	-80.443
10 KMS.	62.913	3.204	.260	.029	28.362	-80.430
	64.000	3.423	.266	.030	28.361	-80.375
	68.000	4.320	.289	.034	28.359	-80.366
Q MAXIMUM	68.604	4.469	.292	.034	28.358	-80.310
	72.000	5.375	.313	.037	28.356	-80.266
34 KMS.	74.399	6.089	.328	.039	28.354	-80.235
	76.000	6.603	.339	.040	28.352	-80.147
	80.000	8.025	.366	.043	28.348	-90.047
	84.000	9.659	.396	.046	28.343	-79.933
	88.000	11.524	.427	.049	28.337	-79.804
	92.000	13.638	.461	.052	28.331	-79.661
	96.000	16.018	.497	.055	28.323	-79.504
	100.000	18.684	.535	.058	28.315	-79.331
	104.000	21.650	.577	.061	28.305	-79.143
	108.000	24.935	.621	.064	28.294	-79.143

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/4CR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	RANGE KM	RANGE ANG. DEG	TOTAL ALPHA DEG	IMP. LAT. DEG	IMP. LONG. DEG
112.000	28.553	.668	.067	28.282	-78.940
116.000	32.520	.719	.070	28.269	-78.721
120.000	36.851	.772	.073	28.254	-78.486
124.000	41.561	.829	.076	28.237	-78.235
128.000	46.668	.890	.079	28.219	-77.968
132.000	52.180	.954	.082	28.199	-77.684
136.000	58.118	1.022	.085	28.177	-77.382
140.000	64.491	1.094	.088	28.154	-77.069
144.000	71.303	1.170	.091	28.129	-76.747
148.000	78.556	1.250	.094	28.102	-76.417
152.000	86.252	1.334	.097	28.074	-76.080
156.000	94.392	1.422	.101	28.044	-75.735
160.000	102.978	1.514	.104	28.013	-75.384
164.000	112.011	1.609	.108	27.980	-75.026
168.000	121.492	1.709	.111	27.946	-74.663
172.000	131.423	1.813	.115	27.909	-74.293
176.000	141.803	1.921	.118	27.872	-73.917
180.000	152.635	2.033	.122	27.832	-73.536
184.000	163.919	2.150	.126	27.791	-73.149
188.000	175.655	2.270	.129	27.747	-72.756
192.000	187.844	2.394	.133	27.702	-72.358
196.000	200.486	2.522	.137	27.655	-71.954
199.989	203.678	2.555	.138	27.643	-71.854
SEPARATION					
196.988	203.678	2.555	.138	27.643	-71.854
200.000	213.451	2.654	.144	27.643	-71.854
204.000	226.423	2.785	.153	27.643	-71.854
208.989	236.109	2.883	.159	27.643	-71.854
206.988	236.109	2.883	.159	27.643	-71.854
206.989	236.109	2.883	10.753	27.643	-71.854
208.000	239.396	2.916	10.744	27.636	-71.795
216.000	265.864	3.184	10.651	27.577	-71.318
224.000	293.215	3.459	10.524	27.515	-70.824
232.000	321.477	3.742	10.364	27.448	-70.313
240.000	350.680	4.034	10.173	27.377	-69.782
ORB IGNITION					
BEGIN MIN-H					

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5°
and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	RANGE KM	RANGE ANG. DEG	TOTAL ALPHA DEG	IMP. LAT. DEG	IMP. LONG. DEG
248.000	380.856	4.335	9.952	27.300	-69.229
255.000	412.037	4.644	9.703	27.217	-68.653
264.000	444.260	4.963	9.427	27.127	-68.049
272.000	477.561	5.292	9.125	27.029	-67.414
280.000	511.979	5.631	8.799	26.923	-66.745
288.000	547.556	5.980	8.450	26.806	-66.035
296.000	584.337	6.340	8.080	26.677	-65.278
304.000	622.368	6.711	7.690	26.532	-64.465
312.000	661.701	7.094	7.280	26.370	-63.583
320.000	702.390	7.490	6.853	26.185	-62.618
328.000	744.492	7.897	6.410	25.971	-61.547
336.000	788.071	8.319	5.951	25.717	-60.339
344.000	833.194	8.754	5.479	25.408	-58.934
352.000	879.936	9.203	4.993	25.025	-57.294
360.000	928.376	9.668	4.496	24.516	-55.249
368.000	978.602	10.149	3.989	23.797	-52.574
376.000	1030.675	10.646	3.478	22.711	-48.902
384.000	1084.601	11.160	2.965	20.803	-43.215
392.000	1140.382	11.691	2.451	16.025	-31.484
400.000	1198.017	12.239	1.937	16.025	-31.484
401.026	1205.544	12.310	1.871	16.025	-31.484
401.026	1205.544	12.310	1.871	16.025	-31.484

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483,504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

	TIME SEC	AERO HEATING INDIC.		ALPHA 0		DES. NODE DEG
		N-M/(MISQ)	LB-FI/(FT)SQ	N-RAD	LB-DEG	
LIFT-OFF	.000	.0	.0	.000	.000	90.000
	.000	.0	.0	.000	.000	90.000
	4.000	1843.3	126.3	-.044	-.000	90.031
	8.000	30998.0	2124.0	-.360	-4.632	90.062
BEGIN TILT	8.000	30998.0	2124.0	-.360	-4.632	90.062
	12.000	163421.9	111.99.0	-.19.716	-253.955	90.085
	16.000	536327.7	36750.1	-.32.989	-424.915	90.090
	20.000	1357148.9	92994.2	-.26.114	-336.361	90.077
END TILT	20.000	1357148.9	92994.2	-.26.114	-336.361	90.077
	24.000	2909621.2	199372.4	.727	9.359	90.048
	28.000	5537611.7	379446.9	1.255	16.169	89.994
	32.000	9653374.4	661466.2	1.999	25.755	89.915
	36.000	15716371.7	1076913.5	2.994	38.559	89.809
	40.000	24211447.5	1659011.1	4.262	54.898	89.678
	44.000	35609132.0	2440000.6	5.811	74.852	89.524
	48.000	50312348.5	3447490.9	7.622	98.178	89.353
	52.000	68545146.0	4696834.4	9.636	124.115	89.169
	56.000	90315410.0	6188571.3	11.772	151.632	88.979
	60.000	115461848.0	7911649.6	13.946	179.527	88.785
10 KMS.	62.913	135849528.0	9308649.5	15.516	199.862	88.641
	64.000	143902618.0	9860461.4	16.090	207.244	88.587
	68.000	175602990.0	12032626.9	18.080	232.881	88.387
0 MAXIMUM	68.604	180665602.0	12379525.9	18.352	236.384	88.357
	72.000	210293028.0	14410060.6	19.676	253.438	88.188
14 KMS.	74.399	232305398.0	15917975.9	20.354	262.173	88.069
	76.000	247379676.0	16950892.0	20.664	266.160	87.991
	80.000	285908848.0	19590978.7	20.881	268.956	87.799
	84.000	324690660.0	22248377.0	20.303	261.513	87.614
	88.000	362430468.0	24834375.5	19.077	245.729	87.438
	92.000	398813900.0	27327432.5	17.818	229.511	87.272
	96.000	433612392.0	29711886.5	16.484	212.321	87.116
100.000	100.000	466665516.0	31976744.7	15.128	194.857	86.971
	104.000	497860652.0	34114290.5	13.784	177.548	86.836
108.000	108.000	527097952.0	36117682.0	12.444	160.286	86.712

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/MCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	AERO HEATING INDIC. N-M/(M)SQ	LB-EI/(EI)SQ	N*RAD	ALPHA °	LB*DEG	DES. NODE DEG
112.000	554176328.0	37973140.0	11.100	142.973	85.596	
116.000	579035616.0	39676542.5	9.835	126.686	86.490	
120.000	601713600.0	41230478.0	8.666	111.623	86.392	
124.000	622294616.0	42640725.5	7.604	97.940	86.301	
128.000	640904104.0	43915880.5	6.655	85.714	86.217	
132.000	657698200.0	45066641.5	5.820	74.961	86.140	
136.000	672852152.0	46105017.0	5.094	65.612	86.068	
140.000	686518936.0	47041489.0	4.464	57.494	86.002	
144.000	698820528.0	47884416.0	3.920	50.491	85.942	
148.000	709904744.0	48643926.0	3.473	44.740	85.888	
152.000	719976976.0	49334093.0	3.097	39.889	85.838	
156.000	729104080.0	49959998.5	2.751	35.435	85.792	
160.000	737327648.0	50522992.0	2.434	31.349	85.750	
164.000	744694272.0	51027766.0	2.144	27.614	85.711	
168.000	751255240.0	51477335.5	1.880	24.215	85.675	
172.000	757065656.0	51875475.0	1.641	21.139	85.642	
176.000	762183504.0	52226159.0	1.426	18.373	85.610	
180.000	766668656.0	52533489.5	1.235	15.906	85.581	
184.000	770581600.0	52801611.5	1.065	13.722	85.554	
188.000	773982232.0	53034628.5	.916	11.805	85.528	
192.000	776928560.0	53236516.5	.787	10.134	85.504	
196.000	779475856.0	53411062.0	.675	8.690	85.481	
196.988	780049568.0	53450373.0	.649	8.366	85.475	
SEPARATION	196.988	780049568.0	.649	8.366	85.475	
200.000	781615064.0	53557644.0	.564	7.271	85.474	
204.000	783296824.0	53672881.0	.472	6.085	85.473	
206.988	784321808.0	53743115.0	.417	5.365	85.471	
ORB IGNITION	206.988	784321808.0	.417	5.365	85.471	
BEGIN MIN-H	206.988	784321808.0	.417	5.365	85.471	
208.000	784321808.0	53743115.0	28.123	362.245	85.469	
216.000	784321809.0	53743115.0	.000	.000	85.469	
224.000	784321808.0	53743115.0	.000	.000	85.448	
232.000	784321808.0	53743115.0	.000	.000	85.428	
240.000	784321808.0	53743115.0	.000	.000	85.408	
			.000	.000	85.389	

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5°
and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	AERO HEATING INDIC.		ALPHA		DES. NODE DEG
	N-M/(MISQ	LB-FT/(FTISQ	N*RAD	LB*DEG	
248.000	784321808.0	53743115.0	.000	.000	85.370
256.000	784321808.0	53743115.0	.000	.000	85.352
264.000	784321808.0	53743115.0	.000	.000	85.335
272.000	784321808.0	53743115.0	.000	.000	85.317
280.000	784321808.0	53743115.0	.000	.000	85.301
288.000	784321808.0	53743115.0	.000	.000	85.284
296.000	784321808.0	53743115.0	.000	.000	85.268
304.000	784321808.0	53743115.0	.000	.000	85.252
312.000	784321808.0	53743115.0	.000	.000	85.237
320.000	784321808.0	53743115.0	.000	.000	85.222
328.000	784321808.0	53743115.0	.000	.000	85.207
336.000	784321808.0	53743115.0	.000	.000	85.193
344.000	784321808.0	53743115.0	.000	.000	85.179
352.000	784321808.0	53743115.0	.000	.000	85.165
360.000	784321808.0	53743115.0	.000	.000	85.151
368.000	784321808.0	53743115.0	.000	.000	85.138
376.000	784321808.0	53743115.0	.000	.000	85.125
384.000	784321808.0	53743115.0	.000	.000	85.113
392.000	784321808.0	53743115.0	.000	.000	85.101
400.000	784321808.0	53743115.0	.000	.000	85.091
401.026	784321808.0	53743115.0	.000	.000	85.089
401.026	784321808.0	53743115.0	.000	.000	85.089

INJECTION

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MOC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME		APOLLO 13		POSITION		COORDINATES		Z
SEC		M	X	FT	M	Y	FT	
LIFT-OFF								
0.000	6373293.3	20909754.7	17911.7	58765.6	773.0	2536.2		
4.000	6373326.9	20909865.2	17841.1	58533.8	2407.2	7897.8		
8.000	6373430.1	20910203.5	17770.2	58301.3	4041.5	13259.4		
12.000	6373430.1	20910203.5	17770.2	58301.3	4041.5	13259.4		
16.000	6373505.8	20910780.0	17699.1	58068.0	5676.6	18623.9		
20.000	6373587.5	20911605.7	17627.8	57834.0	7317.3	24006.8		
24.000	6374188.2	20912690.7	17556.3	57599.3	8969.4	29427.2		
28.000	6374601.1	20914045.5	17484.5	57363.9	10638.5	34903.1		
32.000	6375099.5	20915680.5	17412.5	57127.7	12331.2	40456.8		
36.000	6375686.2	20917605.5	17340.3	56890.9	14056.7	46117.6		
40.000	6376363.6	20919828.0	17267.9	56653.3	15824.8	51918.8		
44.000	6377996.1	20925183.7	17122.5	56176.1	18535.2	64091.8		
48.000	6378950.4	20928315.0	17049.5	55936.5	21501.8	70544.1		
52.000	6379992.4	20931733.5	16976.2	55696.2	23559.2	77293.8		
56.000	6381115.5	20935418.2	16902.8	55455.2	25718.6	84378.7		
60.000	6382312.3	20939344.7	16829.1	55213.6	27991.6	91836.0		
64.000	6383227.7	20942348.0	16775.3	55037.2	29725.9	97526.1		
68.000	6383578.7	20943499.5	16755.3	54971.3	30391.4	99709.3		
72.000	6384913.5	20947878.7	16681.2	54724.4	32933.5	108049.5		
76.000	6385121.1	20948559.7	16670.0	54691.6	33331.1	109353.9		
80.000	6386315.7	20952479.2	16607.0	54484.8	35634.6	116911.5		
84.000	6387188.8	20955343.7	16562.3	54338.4	37338.2	122500.7		
88.000	6387784.7	20957298.7	16532.5	54240.6	38512.4	126352.9		
92.000	6389319.3	20962333.5	16457.9	53995.7	41585.3	136434.8		
96.000	6390918.5	20967580.2	16383.1	53750.2	44972.7	147220.3		
100.000	6392580.1	20973031.7	16308.0	53504.1	48393.8	158772.3		
104.000	6394300.9	20978672.5	16232.8	53257.4	52167.2	171152.1		
108.000	6396077.1	20984504.7	16157.5	53010.0	56211.0	184419.4		
112.000	6397904.0	20990498.5	16081.9	52762.1	60543.3	198632.8		
116.000	6399776.7	20996642.5	16006.1	52513.6	65181.2	213849.0		
120.000	6401689.7	20002919.0	15930.2	52264.4	70141.5	230123.1		

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=29.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	APOLLO 13			POSITION			COORDINATES			Z
	M	X	FT	M	Y	FT	M	FT	M	FT
112.000	6403637.4	21009309.0		15954.1		52014.7	75440.4		247508.0	
116.000	6405613.8	21015793.2		15777.8		51764.5	81093.8		266055.7	
120.000	6407613.1	21022352.5		15701.3		51513.6	87117.3		285817.8	
124.000	6409629.2	21028967.0		15624.7		51262.2	93526.4		306845.1	
128.000	6411656.3	21035617.7		15547.9		51010.2	100336.6		329188.2	
132.000	6413688.6	21042285.2		15470.9		50757.7	107563.3		352897.9	
136.000	6415720.5	21048951.5		15393.8		50504.6	115222.2		378025.6	
140.000	6417744.7	21055597.7		15316.5		50251.0	123324.6		404608.2	
144.000	6419752.2	21062179.2		15239.0		49996.9	131874.0		432657.4	
148.000	6421734.0	21068681.0		15161.4		49742.2	140872.9		462181.6	
152.000	6423681.4	21075070.0		15083.6		49487.0	150323.6		493187.7	
156.000	6425586.2	21081319.2		15005.7		49231.3	160227.8		525681.9	
160.000	6427440.6	21087403.2		14927.6		48975.1	170587.3		559669.7	
164.000	6429237.1	21093297.5		14849.4		48718.4	181403.5		595155.7	
168.000	6430968.6	21098978.0		14771.0		48461.2	192677.4		632143.9	
172.000	6432628.1	21104422.7		14692.4		48203.5	204410.3		670637.5	
176.000	6434209.1	21109609.7		14613.8		47945.4	216602.9		710639.6	
180.000	6435705.1	21114518.0		14534.9		47686.7	229256.0		752152.3	
184.000	6437110.2	21119127.7		14455.9		47427.6	242370.2		795177.7	
188.000	6438418.2	21123419.2		14376.8		47168.1	255945.8		839717.2	
192.000	6439623.7	21127374.2		14297.6		46908.0	269993.3		885772.0	
196.000	6440721.1	21130974.5		14218.2		46647.5	284482.9		933342.8	
198.988	6440974.8	21131807.0		14198.5		46583.1	288135.1		945325.0	
200.000	6441694.4	21134167.7		14138.6		46386.6	299311.7		981993.8	
204.000	6442515.7	21136862.2		14059.0		46125.3	314147.7		1030668.3	
206.988	6443029.2	21138547.0		13999.4		45929.7	325224.9		1067010.9	
208.000	6443029.2	21138547.0		13999.4		45929.7	325224.9		1067010.9	
216.000	6443185.4	21139059.7		13979.2		45863.5	328983.5		1079342.1	
218.000	6444192.2	21142362.7		13919.2		45738.6	359186.6		1178433.8	
224.000	6444787.2	21144315.0		13658.7		44812.1	390285.8		1280465.2	
232.000	6444961.2	21144885.7		13497.8		44284.0	422306.5		1385520.0	
240.000	6444704.1	21144042.2		13336.3		43754.3	455275.6		1493686.3	

SEPARATION

OPR IGNITION
BEGIN MIN-H

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5°
and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME -SEC	APOLLO			J3 POSITION			COORDINATES		
	M	X	FT	M	Y	FT	M	Z	FT
248.000	6444004.8	21141748.0		13174.4		4323.2	489221.3	1605056.7	
256.000	6442851.7	21137864.7		13012.1		42690.5	524173.3	1719728.7	
264.000	6441232.1	21132651.2		12849.3		42156.5	560163.1	1837805.3	
272.000	6439132.4	21125762.2		12686.1		41621.1	597223.6	1959395.0	
280.000	6436537.7	21117249.7		12522.5		41084.4	635390.1	2084613.1	
288.000	6433432.5	21107061.7		12358.6		40545.4	674699.7	2213581.7	
296.000	6429799.3	21095142.0		12194.2		40007.2	715192.1	2346430.9	
304.000	6425619.7	21081429.5		12029.5		39466.9	756909.7	2483299.5	
312.000	6420873.7	21065858.5		11864.5		38925.4	799897.6	2624335.8	
320.000	6415539.4	21048357.5		11699.1		38382.9	844204.3	2769699.0	
328.000	6409593.2	21028849.0		11533.4		37839.3	889882.0	2919560.4	
336.000	6403009.2	21007248.0		11367.4		37294.8	936987.2	3074104.8	
344.000	6395759.4	20983462.5		11201.2		36749.3	985580.8	3233532.8	
352.000	6387812.7	20957390.7		11034.7		36203.0	1035729.4	3398062.3	
360.000	6379175.4	20928922.0		10867.9		35655.8	1087505.6	3567931.7	
368.000	6369690.0	20897933.0		10700.9		35107.8	1140988.5	3743400.5	
376.000	6359439.2	20864301.7		10533.6		34559.1	1196230.3	3924640.0	
384.000	6348350.6	20827921.7		10366.1		34009.6	1253227.0	4111637.0	
392.000	6336392.2	20786688.0		10198.5		33459.6	1311968.8	4304359.6	
400.000	6323532.2	20746496.7		10030.6		32909.9	1372445.2	4502772.8	
401.026	6321816.0	20740866.0		10009.1		32838.2	1380326.9	4528631.4	
401.026	6321816.0	20740866.0		10009.1		32839.2	1390326.9	4528631.4	
INJECTION									

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483,504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

	TIME SEC	APOLLO 13 VELOCITY COMPONENTS					
		XDOT M/SEC	YDOT FT/SEC	M/SEC	FT/SEC	M/SEC	FT/SEC
LIFT-OFF	0.000	0.000	0.000	-17.632	-57.849	408.553	1340.395
	4.000	0.000	0.000	-17.632	-57.849	408.553	1340.395
	8.000	16.963	55.652	-17.689	-58.036	408.552	1340.395
BEGIN TILT	8.000	34.728	113.938	-17.747	-58.224	408.557	1340.409
	12.000	34.724	113.938	-17.747	-58.224	408.557	1340.409
	16.000	53.300	174.870	-17.802	-58.401	409.239	1342.647
	20.000	72.668	238.413	-17.858	-58.589	411.357	1349.598
END TILT	20.000	92.824	304.540	-17.913	-58.769	414.953	1361.396
	24.000	92.824	304.540	-17.913	-58.769	414.953	1361.396
	28.000	113.789	373.324	-17.967	-58.948	419.886	1377.580
	32.000	135.522	444.625	-18.021	-59.126	426.877	1400.515
	36.000	157.927	518.132	-18.075	-59.302	436.253	1431.276
	40.000	180.847	593.329	-18.128	-59.476	448.306	1470.819
	44.000	204.070	669.520	-18.181	-59.649	463.280	1519.949
	48.000	227.218	745.464	-18.233	-59.820	481.332	1579.173
	52.000	249.788	819.514	-18.285	-59.990	502.505	1648.640
	56.000	270.943	888.920	-18.336	-60.159	526.627	1727.780
	60.000	290.268	952.324	-18.387	-60.326	553.574	1816.187
10 KMS.	60.000	307.975	1010.418	-18.438	-60.491	583.481	1914.309
	64.000	320.530	1051.608	-18.474	-60.611	607.545	1993.259
	68.000	325.187	1066.885	-18.488	-60.655	617.061	2024.479
Q MAXIMUM	68.000	342.176	1122.625	-18.537	-60.817	654.690	2147.933
	72.000	344.723	1130.982	-18.545	-60.842	660.743	2167.792
	76.000	358.938	1177.620	-18.586	-60.978	696.603	2285.442
14 KMS.	76.000	368.889	1210.265	-18.615	-61.073	727.899	2374.996
	80.000	375.485	1231.906	-18.635	-61.137	743.046	2437.815
	84.000	391.788	1295.392	-18.683	-61.295	794.237	2605.765
	88.000	407.711	1337.636	-18.730	-61.451	850.274	2789.614
	92.000	422.952	1387.639	-18.777	-61.605	911.032	2988.951
	96.000	437.297	1434.700	-18.824	-61.758	976.405	3203.427
	100.000	450.579	1478.278	-18.870	-61.909	1046.284	3432.689
	104.000	462.669	1517.939	-18.916	-62.059	1120.554	3676.360
	108.000	473.469	1553.344	-18.961	-62.207	1199.099	3934.050
	112.000	482.839	1584.113	-19.005	-62.354	1281.738	4205.178

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5°
and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME -SEC	APOLLO 13		VELOCITY		COMPONENTS	
	M/SEC	XDOT	FT/SEC	M/SEC	YDOT	FT/SEC
112.000	490.757		1610.094	-19.050	-62.498	1368.377
116.000	497.200		1631.234	-19.093	-62.642	1458.955
120.000	502.184		1647.519	-19.136	-62.784	1553.430
124.000	505.650		1658.956	-19.179	-62.924	1651.769
128.000	507.672		1665.590	-19.221	-63.062	1753.966
132.000	508.257		1667.509	-19.263	-63.199	1860.052
136.000	507.377		1664.621	-19.304	-63.335	1969.909
140.000	504.360		1654.723	-19.345	-63.468	2081.365
144.000	499.022		1637.210	-19.385	-63.601	2193.450
148.000	491.486		1612.487	-19.425	-63.731	2306.117
152.000	481.855		1590.888	-19.465	-63.860	2419.290
156.000	470.222		1542.722	-19.503	-63.988	2532.904
160.000	456.674		1498.276	-19.542	-64.114	2646.897
164.000	441.294		1447.816	-19.580	-64.238	2761.218
168.000	424.157		1391.591	-19.617	-64.361	2875.817
172.000	405.333		1329.832	-19.654	-64.482	2990.653
176.000	384.888		1262.755	-19.690	-64.601	3105.686
180.000	362.883		1190.562	-19.728	-64.719	3220.881
184.000	339.378		1113.445	-19.762	-64.836	3336.205
188.000	314.426		1031.580	-19.797	-64.951	3451.630
192.000	288.077		945.136	-19.831	-65.064	3567.128
196.000	260.382		854.270	-19.866	-65.176	3682.676
198.988	253.339		831.165	-19.874	-65.203	3711.218
SEPARATION	253.339		831.165	-19.874	-65.203	3711.218
200.000	224.477		736.473	-19.899	-65.246	3709.905
204.000	186.169		610.790	-19.932	-65.395	3706.084
206.988	157.568		516.955	-19.957	-65.475	3706.668
ORR IGNITION	157.568		516.955	-19.957	-65.475	3706.668
206.988	157.568		516.955	-19.957	-65.475	3706.668
BEGIN MIN-H	151.205		496.078	-19.965	-65.502	3720.426
208.000	100.304		329.080	-20.029	-65.711	3830.874
216.000	48.272		158.372	-20.091	-65.915	3944.445
224.000	-4.979		-16.334	-20.151	-66.112	4061.289
232.000	-59.542		-195.348	-20.209	-66.303	4181.572
240.000						13719.069

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5°
and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	APOLLO 13		VELOCITY COMPONENTS		ZDOT	
	XDOT M/SEC	YDOT FT/SEC	M/SEC	FT/SEC	M/SEC	FT/SEC
248.000	-115.520	-379.003	-20.266	-66.488	4305.474	14125.570
256.000	-173.022	-567.656	-20.320	-66.667	4433.189	14544.584
264.000	-232.165	-761.695	-20.373	-66.840	4564.932	14976.810
272.000	-293.078	-961.541	-20.424	-67.007	4700.935	15423.015
280.000	-355.900	-1167.650	-20.473	-67.168	4841.456	15884.042
284.000	-423.782	-1380.520	-20.520	-67.323	4986.778	16360.819
296.000	-487.893	-1600.698	-20.565	-67.472	5137.214	16854.377
304.000	-557.413	-1828.784	-20.609	-67.615	5293.113	17365.856
312.000	-629.547	-2065.442	-20.651	-67.752	5454.863	17896.532
320.000	-704.517	-2311.408	-20.691	-67.883	5622.899	18447.831
328.000	-782.575	-2567.502	-20.729	-68.008	5797.710	19021.358
336.000	-863.999	-2834.644	-20.765	-68.127	5979.849	19618.927
344.000	-949.107	-3113.869	-20.800	-68.240	6169.945	20242.601
352.000	-1038.257	-3406.354	-20.832	-68.347	6368.716	20894.736
360.000	-1131.857	-3713.440	-20.863	-68.449	6576.987	21578.043
368.000	-1230.314	-4036.463	-20.892	-68.545	6795.136	22293.752
376.000	-1333.050	-4373.523	-20.920	-68.635	7015.093	23015.398
384.000	-1439.777	-4723.677	-20.946	-68.719	7233.871	23733.174
392.000	-1550.482	-5086.884	-20.970	-68.798	7451.368	24446.746
400.000	-1665.150	-5463.091	-20.992	-68.871	7667.490	25155.808
401.026	-1680.143	-5512.282	-20.995	-68.880	7695.106	25246.410
401.026	-1689.143	-5512.282	-20.995	-58.880	7695.106	25246.410

INJECTION

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

APOLLO 13 ACCELERATION COMPONENTS									
TIME SEC	XDDOT		YDDOT		ZDDOT				
	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	FT/SEC**2
LIFT-OFF	.000	4.114	13.498	-.014	-.047	-.001	-.001	-.002	
	.000	4.114	13.498	-.014	-.047	-.001	-.001	-.002	
	4.000	4.341	14.241	-.014	-.047	.000	.000	.002	
BEGIN TILT	8.000	4.542	14.903	-.014	-.047	.002	.002	.006	
	12.000	4.542	14.903	-.014	-.047	.002	.002	.006	
	16.000	4.940	15.561	-.014	-.046	.748	.748	1.143	
	20.000	5.138	16.209	-.014	-.045	.713	.713	2.338	
END TILT	20.000	5.138	16.856	-.014	-.045	1.087	1.087	3.567	
	24.000	5.338	17.514	-.014	-.045	1.476	1.476	4.843	
	28.000	5.526	18.128	-.013	-.044	2.033	2.033	6.671	
	32.000	5.673	18.611	-.013	-.044	2.667	2.667	8.751	
	36.000	5.778	18.957	-.013	-.043	3.369	3.369	11.054	
	40.000	5.812	19.067	-.013	-.043	4.123	4.123	13.527	
	44.000	5.751	18.867	-.013	-.043	4.908	4.908	16.102	
	48.000	5.486	17.999	-.013	-.042	5.667	5.667	18.592	
	52.000	5.075	16.650	-.013	-.042	6.389	6.389	20.962	
	56.000	4.575	15.010	-.013	-.042	7.078	7.078	23.221	
	60.000	4.333	14.217	-.013	-.041	7.910	7.910	25.952	
10 KMS.	62.913	4.292	14.081	-.012	-.041	8.619	8.619	28.279	
	64.000	4.277	14.032	-.012	-.041	8.892	8.892	29.175	
	68.000	4.218	13.839	-.012	-.040	9.932	9.932	32.586	
0 MAXIMUM	68.604	4.210	13.811	-.012	-.040	10.095	10.095	33.119	
	72.000	4.164	13.660	-.012	-.040	11.035	11.035	36.202	
14 KMS.	74.399	4.131	13.554	-.012	-.040	11.725	11.725	38.467	
	76.000	4.109	13.479	-.012	-.040	12.197	12.197	40.015	
	80.000	4.039	13.251	-.012	-.039	13.405	13.405	43.979	
	84.000	3.902	12.802	-.012	-.039	14.600	14.600	47.899	
	88.000	3.706	12.158	-.012	-.038	15.770	15.770	51.740	
	92.000	3.460	11.350	-.012	-.038	16.911	16.911	55.483	
	96.000	3.176	10.421	-.011	-.038	18.024	18.024	59.132	
	100.000	2.864	9.396	-.011	-.037	19.107	19.107	62.687	
	104.000	2.525	8.285	-.011	-.037	20.155	20.155	66.125	
	108.000	2.163	7.097	-.011	-.036	21.162	21.162	69.430	

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

WDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

TIME SEC	APOLLO 13 ACCELERATION COMPONENTS							
	XDDOT				YDDOT			
	M/SFC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2
112.000	1.796	5.991	-.011	-.036	22.154	72.684		
116.000	1.426	4.678	-.011	-.036	23.133	75.896		
120.000	1.056	3.466	-.011	-.035	24.104	79.081		
124.000	.688	2.256	-.011	-.035	25.066	82.238		
128.000	.325	1.065	-.010	-.034	26.034	85.412		
132.000	-.031	-.102	-.010	-.034	27.012	88.621		
136.000	-.459	-1.507	-.010	-.034	27.763	91.086		
140.000	-1.051	-3.447	-.010	-.033	27.942	91.672		
144.000	-1.614	-5.294	-.010	-.033	28.097	92.183		
148.000	-2.150	-7.054	-.010	-.032	28.233	92.628		
152.000	-2.662	-8.733	-.010	-.032	28.351	93.015		
156.000	-3.151	-10.338	-.010	-.032	28.453	93.350		
160.000	-3.619	-11.874	-.010	-.031	28.541	93.640		
164.000	-4.068	-13.346	-.009	-.031	28.617	93.888		
168.000	-4.499	-14.757	-.009	-.030	28.681	94.098		
172.000	-4.911	-16.113	-.009	-.030	28.735	94.275		
176.000	-5.309	-17.417	-.009	-.030	28.780	94.422		
180.000	-5.691	-18.671	-.009	-.029	28.816	94.541		
184.000	-6.059	-19.880	-.009	-.029	28.845	94.635		
188.000	-6.415	-21.045	-.009	-.029	28.867	94.706		
192.000	-6.757	-22.170	-.009	-.028	28.882	94.757		
196.000	-7.089	-23.257	-.008	-.028	28.891	94.788		
196.988	-7.163	-23.519	-.008	-.028	28.893	94.792		
196.988	-9.584	-31.444	-.008	-.028	28.893	94.792		
200.000	-9.580	-31.430	-.008	-.027	28.893	94.792		
204.000	-9.574	-31.412	-.008	-.027	28.893	94.792		
206.988	-9.570	-31.399	-.008	-.027	28.893	94.792		
206.988	-8.682	-28.485	-.008	-.027	28.893	94.792		
206.988	-6.279	-20.600	-.008	-.027	28.893	94.792		
208.000	-6.295	-20.654	-.008	-.027	28.893	94.792		
216.000	-6.432	-21.101	-.008	-.026	28.893	94.792		
224.000	-6.578	-21.582	-.008	-.026	28.893	94.792		
232.000	-6.736	-22.101	-.007	-.024	28.893	94.792		
240.000	-6.907	-22.660	-.007	-.024	28.893	94.792		

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Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5°
and a Cargo of 29,483.504 kg (65,000 lbs)

(Continued)

MDC/HCR I=28.5 FUEL 3064K+524K (65K PAYLOAD)

APOLLO 13 ACCELERATION COMPONENTS									
TIME		X000T		Y000T		Z000T			
SEC	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	
248.000	-7.090	-23.261	-0.007	-0.023	15.722	51.581			
256.000	-7.288	-23.910	-0.007	-0.022	16.211	53.187			
264.000	-7.501	-24.609	-0.006	-0.021	16.729	54.885			
272.000	-7.730	-25.362	-0.006	-0.020	17.277	56.683			
280.000	-7.978	-26.175	-0.006	-0.020	17.859	58.592			
288.000	-8.246	-27.053	-0.006	-0.019	18.478	60.623			
296.000	-8.535	-28.003	-0.006	-0.018	19.138	62.790			
304.000	-8.849	-29.032	-0.005	-0.017	19.844	65.107			
312.000	-9.189	-30.148	-0.005	-0.017	20.602	67.592			
320.000	-9.559	-31.361	-0.005	-0.016	21.417	70.266			
328.000	-9.961	-32.682	-0.005	-0.015	22.297	73.153			
336.000	-10.401	-34.125	-0.004	-0.015	23.251	76.282			
344.000	-10.883	-35.706	-0.004	-0.014	24.288	79.685			
352.000	-11.413	-37.443	-0.004	-0.013	25.422	83.404			
360.000	-11.997	-39.360	-0.004	-0.012	26.666	87.487			
368.000	-12.592	-41.513	-0.004	-0.012	27.566	90.439			
376.000	-13.092	-42.952	-0.003	-0.011	27.423	89.972			
384.000	-13.590	-44.586	-0.003	-0.010	27.269	89.466			
392.000	-14.086	-46.215	-0.003	-0.009	27.103	88.921			
400.000	-14.580	-47.836	-0.003	-0.009	26.925	88.338			
401.026	-14.644	-48.043	-0.003	-0.009	26.902	88.260			
401.026	-14.644	-48.043	-0.003	-0.009	26.902	88.260			
INJECTION									

Table C-3. Trajectory Tables for the Mission with an Inclination of 28.5° and a Cargo of 29,483.504 kg (65,000 lbs)

(concluded)			
I = 28.5°			
ROBOT 50X100 HCR SHUTTLE			
TIME	.40102539+03 SEC	RANGE	.12055435+07 M
		RANGE ANGLE	.12310087+02 DEG
INERTIAL VELOCITY	.78764192+04 M/SEC	RADIUS	.64707619+07 M
		FLIGHT PATH ANGLE	-.74379917-05 DEG
INCL	.28500000+02 DEG	DFS NODE	.85089393+02 DEG
		FLIGHT AZIMUTH	.92471228+02 DEG
ROLL AT	.27363434+02 DEG	ROLL AT	.27206665+02 DEG
		LONG	-.68450572+02 DEG
INERTIAL AZIMUTH	.94832297+02 DEG	C1	.50966433+11 M**2/SEC
WEIGHT	.33349335+06 LBS	C3	-.61163339+08 M**2/SEC**2
KEPLERIAN ORBITAL PARAMETERS			
ECENTRICITY	.71021427-02	APOGEE RADIUS	.65633128+07 M
		PERIGEE RADIUS	.64707432+07 M
APOGEE HEIGHT	.99971821+02 NM	PERIGEE HEIGHT	.49988256+02 NM

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

MDC/HCR I=90.0 FUEL 30E4K+524K (40K PAYLOAD)

	TIME SEC	INERTIAL M/SEC	VELOCITY FT/SEC	RELATIVE M/SEC	VELOCITY FT/SEC	GAMMA S DEG	GAMMA R DEG
LIFT-OFF	0.000	381.874	1252.867	.000	.000	-0.000	-0.079
	.000	381.874	1252.867	.000	.000	-0.000	-0.079
	4.000	382.271	1254.171	17.473	57.326	2.620	89.820
	8.000	383.536	1258.320	35.759	117.319	5.350	89.818
REGIN TILT	8.000	383.536	1258.320	35.759	117.319	5.350	89.818
	12.000	385.716	1265.471	54.886	180.008	8.177	89.435
	16.000	388.914	1275.965	74.824	245.487	11.086	87.992
	20.000	393.249	1290.189	95.698	313.969	14.054	86.297
END TILT	20.000	393.249	1290.189	95.698	313.969	14.054	86.297
	24.000	398.853	1308.574	117.569	385.724	17.064	84.568
	28.000	405.849	1331.524	140.549	461.120	20.085	82.576
	32.000	414.365	1359.464	164.711	540.390	23.072	80.355
	36.000	424.529	1392.811	190.116	623.742	26.973	77.940
	40.000	436.446	1431.910	216.790	711.252	28.725	75.365
	44.000	450.136	1476.824	244.617	802.550	31.248	72.663
	48.000	465.459	1527.098	273.276	896.576	33.450	69.861
	52.000	482.081	1581.630	302.234	991.583	35.240	66.978
	56.000	499.844	1639.909	331.367	1087.162	36.584	64.032
10 KMS.	60.000	519.265	1703.624	361.554	1186.201	37.532	61.037
	62.007	531.670	1744.323	380.089	1247.010	37.930	59.299
	64.000	541.429	1776.343	394.324	1293.713	38.155	58.022
0 MAXIMUM	67.708	564.920	1853.412	427.525	1402.642	38.442	55.238
	68.000	566.903	1859.918	430.268	1411.639	38.453	55.020
	72.000	596.157	1955.896	469.804	1541.351	38.426	52.060
14 KMS.	73.680	609.689	2000.292	487.583	1599.682	38.321	50.837
	76.000	629.673	2065.857	513.348	1684.212	38.089	49.172
	80.000	667.874	2191.188	561.241	1841.342	37.468	46.376
	84.000	710.974	2332.590	613.591	2013.093	36.596	43.693
	88.000	758.955	2490.111	670.276	2199.068	35.516	41.132
	92.000	811.811	2663.421	731.239	2399.078	34.276	38.700
	96.000	869.502	2852.697	796.424	2612.941	32.924	36.399
	100.000	931.964	3057.625	865.774	2840.466	31.502	34.227
	104.000	999.105	3277.905	939.218	3081.423	30.046	32.183
	108.000	1070.775	3513.041	1016.634	3305.413	28.585	30.261

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

C-E-AERO-GT

WDC/HCR I=90.0 FUEL 3064K+524K (40K PAYLOAD)

TIME SEC	INERTIAL VELOCITY		RELATIVE VELOCITY		GAMMA S		GAMMA R	
	M/SEC	FT/SEC	M/SEC	FT/SEC	DEG	DEG	DEG	DEG
112.000	1146.894	3762.775	1097.986	3602.316	27.139	28.455		
116.000	1227.424	4026.982	1183.281	3882.155	25.725	26.759		
120.000	1312.332	4305.552	1272.529	4174.963	24.354	25.168		
124.000	1403.587	4598.382	1365.739	4480.771	23.034	23.674		
128.000	1495.195	4905.494	1462.957	4799.726	21.768	22.273		
132.000	1593.189	5226.999	1564.251	5132.058	20.561	20.959		
136.000	1694.513	5559.425	1668.569	5474.306	19.411	19.725		
140.000	1796.964	5895.551	1773.695	5819.210	18.316	18.565		
144.000	1900.416	6234.960	1879.550	6166.502	17.275	17.473		
148.000	2004.792	6577.401	1986.095	6516.059	16.285	16.443		
152.000	2110.025	6922.653	2093.294	6867.763	15.343	15.469		
156.000	2216.055	7270.521	2201.115	7221.505	14.448	14.548		
160.000	2322.429	7620.830	2309.525	7577.183	13.596	13.675		
164.000	2430.300	7973.424	2418.497	7934.701	12.788	12.848		
168.000	2538.423	8328.160	2528.002	8293.970	12.012	12.062		
172.000	2647.161	8684.911	2638.015	8654.904	11.276	11.316		
176.000	2755.476	9043.557	2748.511	9017.424	10.575	10.606		
180.000	2864.337	9403.991	2859.467	9381.453	9.907	9.931		
184.000	2972.711	9766.113	2970.861	9746.920	9.270	9.289		
188.000	3082.572	10129.830	3082.673	10113.757	8.663	8.677		
192.000	3192.893	10495.057	3194.883	10481.900	8.084	8.094		
196.000	3310.650	10961.713	3307.473	10851.288	7.531	7.539		
198.156	3371.050	11059.876	3368.299	11050.851	7.244	7.250		
200.000	3371.050	11059.876	3368.299	11050.851	7.244	7.250		
204.000	3458.983	11522.766	3456.165	11043.847	7.001	7.006		
208.000	3548.441	11936.192	3561.792	11029.503	6.471	6.477		
208.156	3550.353	11924.781	3557.774	11016.318	5.941	5.946		
208.156	3550.201	11924.283	3557.625	11015.829	5.920	5.925		
208.156	3550.201	11924.283	3557.625	11015.829	5.920	5.925		
208.156	3550.201	11924.283	3557.625	11015.829	5.920	5.925		
212.000	3613.964	11700.340	3411.704	11193.255	5.597	5.600		
220.000	3528.669	11576.999	3527.357	11572.693	4.959	4.960		
224.000	3547.830	11367.947	3647.336	11966.327	4.366	4.367		
236.000	3771.507	12373.709	3771.805	12374.687	3.818	3.818		

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Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR I=90.0 FUEL 3064K+524K (40K PAYLOAD)

TIME SEC	INERTIAL M/SEC	VELOCITY FT/SEC	RELATIVE M/SEC	VELOCITY FT/SEC	GAMMA S DEG	GAMMA R DEG
244.000	3899.881	12794.886	3900.945	12798.375	3.312	3.311
252.000	4033.160	13232.154	4034.964	13238.070	2.846	2.845
260.000	4171.576	13686.273	4174.005	13694.536	2.420	2.418
268.000	4315.389	14158.101	4318.599	14168.633	2.031	2.029
276.000	4464.893	14648.599	4468.773	14661.327	1.677	1.676
284.000	4620.479	15158.856	4624.946	15173.707	1.359	1.358
292.000	4782.339	15690.087	4787.492	15706.994	1.074	1.073
300.000	4951.873	16243.576	4956.832	16262.571	.822	.821
308.000	5127.094	16821.176	5133.440	16841.995	.601	.601
316.000	5310.943	17424.355	5317.857	17447.038	.412	.411
324.000	5503.232	18055.224	5510.696	18079.712	.252	.251
332.000	5704.662	18716.093	5712.659	18742.319	.123	.121
340.000	5916.038	19409.574	5924.551	19437.503	.019	.019
348.000	6138.283	20138.744	6147.303	20168.316	-.054	-.054
356.000	6370.934	20902.014	6380.430	20933.171	-.102	-.101
364.000	6605.261	21670.804	6615.210	21703.443	-.130	-.130
372.000	6839.811	22440.324	6850.181	22474.348	-.143	-.143
380.000	7074.543	23210.444	7085.308	23245.762	-.139	-.138
388.000	7309.416	23981.023	7320.551	24017.555	-.118	-.118
396.000	7544.390	24751.936	7555.870	24789.600	-.081	-.080
404.000	7779.423	25523.041	7791.228	25561.772	-.027	-.027
407.331	7876.403	25841.218	7888.337	25880.370	.000	.000
407.331	7876.403	25841.218	7888.337	25880.370	.000	.000

INJECTION

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

WDC/HCR I=90.0 FUEL 3064K+524K (40K PAYLOAD)

	TIME SEC	MASS KGS	WEIGHT LBS	THRUST N	LRS	LONGIT. ACCELERATION	
						M/SEC ² SQ	FT/SEC ² SQ
LIFT-OFF	0.000	2087442.2	4502022.3	29358262.0	6599999.9	14.04	46.05
	4.000	2087442.2	4602022.3	29358262.0	6599999.9	14.04	46.05
	8.000	2057436.9	4535871.9	29369732.5	6602578.6	14.27	46.81
	12.000	2027431.6	4469721.6	29405111.0	6610532.0	14.47	47.48
	16.000	2027431.6	4469721.6	29405111.0	6610532.0	14.47	47.48
	20.000	1997426.3	4403571.2	29464537.0	6623891.4	14.68	48.15
	24.000	1967421.0	4337420.9	29547885.0	6642628.9	14.89	48.85
	28.000	1937415.7	4271270.6	29654333.5	6666559.4	15.11	49.58
	32.000	1907410.4	4205120.2	29782396.2	6696349.1	15.35	50.35
	36.000	1877405.1	4138959.8	29930030.0	6728538.4	15.60	51.17
	40.000	1847399.9	4072819.5	30094390.5	6765488.2	15.84	51.97
	44.000	1817394.6	4006669.2	30272091.5	6805436.9	16.08	52.74
	48.000	1787389.3	3940519.8	30459229.2	6847507.2	16.27	53.39
	52.000	1757384.0	3874369.5	30651556.7	6890744.1	16.43	53.90
	56.000	1727378.7	3808218.2	30844669.0	6934157.5	16.58	54.34
	60.000	1697373.4	3742067.9	31034040.5	6976729.9	16.75	54.81
	64.000	1667368.1	3675917.5	31215534.5	7017531.4	16.97	55.25
	68.000	1637362.8	3609767.1	31395713.7	7056789.2	17.16	55.67
	72.000	1607357.5	3543615.9	31542339.0	7090999.9	17.35	56.03
	76.000	1579544.3	3482299.2	31674149.2	7120632.1	17.50	56.33
	80.000	1557352.2	3417466.5	31683931.2	7122831.1	17.63	56.56
	84.000	1547347.6	3411316.1	31808421.2	7150817.6	17.74	56.73
	88.000	1537342.4	3393531.1	3185575.7	7161373.4	17.84	56.93
	92.000	1517341.7	3345165.8	3191489.2	717472.6	18.34	60.18
	96.000	1497336.4	3279015.5	32003099.7	7194592.9	18.78	61.60
	100.000	1477331.1	3212865.1	32073355.7	7210377.2	19.57	64.21
	104.000	1457325.8	31466714.7	32127581.5	7222567.7	20.34	66.73
	108.000	1437320.5	3080564.4	32169141.7	7231910.8	21.09	69.19
	112.000	1417315.2	3014414.1	32200697.7	7239004.9	21.83	71.63
	116.000	1397309.9	2948263.7	3224487.5	7244353.0	22.57	74.03
	120.000	1377304.6	2882113.4	3224247.5	7244353.0	23.30	76.43
	124.000	1357299.4	2815963.1	32255748.2	7251380.7	24.01	78.76
	128.000	1337294.1	2750813.4	32269019.7	7258407.4	24.71	81.07

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR I=90.0 FUEL 30ENK+524K (40K PAYLOAD)

TIME SEC	MASS KGS	WEIGHT LBS	THRUST N	LRS	M/SEC)SQ FT/SEC)SQ	ACCELERATION FT/SEC)SQ
112.000	1247294.1	2749812.7	32265703.2	7257618.7	25.43	83.42
116.000	1217288.8	2635662.4	32273064.0	7255273.4	26.16	85.81
120.000	1187283.5	2617512.0	32278495.2	7256494.4	26.90	88.25
124.000	1157278.2	2551361.7	32282497.7	7257394.2	27.66	90.75
128.000	1127272.9	2485211.3	32285446.5	7258057.2	28.45	93.34
132.000	1097268.2	2419062.3	32287622.0	7258546.2	29.27	96.04
136.000	1067548.0	2353540.5	31541557.2	7090824.2	29.42	96.52
140.000	1038646.6	2283823.7	30666314.7	6894136.7	29.42	96.52
144.000	1010545.6	2227871.6	29820287.5	6703867.4	29.42	96.52
148.000	983219.2	2167627.2	2900651.2	6519605.8	29.42	96.52
152.000	956643.5	2109037.8	28205438.7	6340834.9	29.42	96.52
156.000	930296.1	2052054.0	27433665.2	6167333.3	29.42	96.52
160.000	905655.1	1996627.7	26685574.0	5999155.7	29.42	96.52
164.000	881199.0	1942711.2	25959641.5	5835959.6	29.42	96.52
168.000	857407.9	1890260.9	25254153.2	5677359.6	29.42	96.52
172.000	834253.2	1839235.6	24568466.5	5523211.0	29.42	96.52
176.000	811746.8	1789595.4	23901964.0	5373375.3	29.42	96.52
180.000	789841.0	1741301.4	23254047.5	5227717.9	29.42	96.52
184.000	768528.9	1694316.3	22624143.2	5086109.7	29.42	96.52
188.000	747794.0	1648603.5	22011695.0	4948425.9	29.42	96.52
192.000	727620.2	1604127.8	21416168.5	4814546.2	29.42	96.52
196.000	707992.1	1560855.3	20837048.2	4684354.8	29.42	96.52
198.156	697635.2	1538022.3	20531581.2	4615683.1	29.42	96.52
198.156	370458.1	816742.4	.0	.0	.00	.00
200.000	370468.1	816742.4	.0	.0	.00	.00
204.000	370468.1	816742.4	.0	.0	.00	.00
208.000	370468.1	816742.4	.0	.0	.00	.00
208.156	370468.1	816742.4	.0	.0	.00	.00
208.156	370468.1	816742.4	.0	.0	.00	.00
212.000	355664.6	806152.4	6389085.3	1436323.5	17.25	56.58
220.000	355664.6	789415.0	5613531.1	1261972.0	15.15	49.71
228.000	345672.6	762077.6	5613531.1	1261972.0	15.35	50.37
236.000	335676.6	740040.2	5613531.1	1261972.0	15.78	51.78
					16.24	53.28
					16.72	54.87

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

WDC/HCR I=90.0 FUEL 30ENK+524K (40K PAYLOAD)

TIME SEC	MASS KGS	WEIGHT LBS	THRUST N	LBS	LONGIT. ACCELERATION M/SEC ² SQ FT/SEC ² SQ
244.000	325680.6	718002.8	5613531.1	1261972.0	17.24 56.55
252.000	315684.6	695965.4	5613531.1	1261972.0	17.78 58.34
260.000	305688.6	673928.0	5613531.1	1261972.0	18.36 60.25
268.000	295692.6	651890.6	5613531.1	1261972.0	18.98 62.28
276.000	285696.6	629853.2	5613531.1	1261972.0	19.65 64.46
284.000	275700.6	607815.8	5613531.1	1261972.0	20.36 66.80
292.000	265704.6	585778.4	5613531.1	1261972.0	21.13 69.31
300.000	255708.6	563741.0	5613531.1	1261972.0	21.95 72.02
308.000	245712.6	541703.6	5613531.1	1261972.0	22.85 74.95
316.000	235716.6	519666.2	5613531.1	1261972.0	23.81 78.13
324.000	225720.6	497628.8	5613531.1	1261972.0	24.87 81.59
332.000	215724.6	475591.4	5613531.1	1261972.0	26.02 85.37
340.000	205728.6	453553.9	5613531.1	1261972.0	27.29 89.52
348.000	195732.6	431516.5	5613531.1	1261972.0	28.68 94.09
356.000	185736.6	409479.1	5466773.7	1228867.2	29.42 96.52
364.000	175740.6	387441.7	5187278.6	1166146.6	29.42 96.52
372.000	165744.6	365404.3	4922522.9	1106627.2	29.42 96.52
380.000	155748.6	343366.9	4671280.2	1050145.6	29.42 96.52
388.000	145752.6	321329.5	4432860.7	995546.7	29.42 96.52
396.000	135756.6	300292.1	4206610.1	945683.6	29.42 96.52
404.000	125760.6	279254.7	3991907.0	897416.4	29.42 96.52
412.000	115764.6	257717.3	37906548.6	878227.1	29.42 96.52
420.000	105768.6	236180.0	35906548.6	878227.1	29.42 96.52
428.000	95772.6	214642.6	33906548.6	878227.1	29.42 96.52
436.000	85776.6	193105.2	31906548.6	878227.1	29.42 96.52
444.000	75780.6	171567.8	29906548.6	878227.1	29.42 96.52
452.000	65784.6	150030.4	27906548.6	878227.1	29.42 96.52
460.000	55788.6	128493.0	25906548.6	878227.1	29.42 96.52
468.000	45792.6	106955.6	23906548.6	878227.1	29.42 96.52
476.000	35796.6	85418.2	21906548.6	878227.1	29.42 96.52
484.000	25800.6	63880.8	19906548.6	878227.1	29.42 96.52
492.000	15804.6	42343.4	17906548.6	878227.1	29.42 96.52
500.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
508.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
516.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
524.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
532.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
540.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
548.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
556.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
564.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
572.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
580.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
588.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
596.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
604.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
612.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
620.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
628.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
636.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
644.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
652.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
660.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
668.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
676.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
684.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
692.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
700.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
708.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
716.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
724.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
732.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
740.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
748.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
756.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
764.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
772.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
780.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
788.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
796.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
804.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
812.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
820.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
828.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
836.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
844.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
852.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
860.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
868.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
876.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
884.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
892.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
900.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
908.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
916.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
924.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
932.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
940.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
948.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
956.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
964.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
972.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
980.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
988.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
996.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1004.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1012.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1020.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1028.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1036.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1044.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1052.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1060.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1068.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1076.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1084.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1092.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1100.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1108.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1116.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1124.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1132.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1140.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1148.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1156.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1164.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1172.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1180.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1188.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1196.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1204.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1212.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1220.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1228.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1236.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1244.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1252.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1260.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1268.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1276.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1284.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1292.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1300.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1308.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1316.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1324.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1332.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1340.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1348.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1356.000	5808.6	20806.0	15906548.6	878227.1	29.42 96.52
1364.000					

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)
(Continued)

MOC/HCR I=90.0 FUEL 30E4K+524K (40K PAYLOAD)

	TIME SEC	ALTITUDE M	FT	RADIUS M	FT	INCL DFG
LIFT-OFF	0.000	-0.25	-0.8	6371204.87	20902903.0	34.7196
	0.000	-0.25	-0.8	6371204.87	20902903.0	34.7196
	4.000	34.25	112.4	6371239.44	20903016.2	34.7196
BEGIN TILT	8.000	140.56	461.2	6371345.69	20903365.0	34.7197
	8.000	140.56	461.2	6371345.69	20903365.0	34.7197
	12.000	321.54	1054.8	6371526.62	20903958.5	34.7197
	16.000	580.50	1904.5	6371785.69	20904808.5	34.7215
END TILT	20.000	920.75	3020.8	6372125.94	20905924.7	34.7302
	20.000	920.75	3020.8	6372125.94	20905924.7	34.7302
	24.000	1345.37	4414.0	6372550.69	20907318.2	34.7542
	28.000	1857.81	6095.2	6373063.31	20909000.2	34.8120
	32.000	2460.81	8073.5	6373666.56	20910979.5	34.9332
	36.000	3156.87	10357.2	6374363.06	20913264.5	35.1615
	40.000	3947.62	12951.5	6375154.37	20915860.7	35.5542
	44.000	4833.44	15857.7	6376041.00	20918769.5	36.1777
	48.000	5812.94	19071.3	6377021.56	20921986.5	37.0946
	52.000	6881.56	22577.3	6378101.50	20925497.0	38.3446
	56.000	8032.75	26354.2	6379244.37	20929279.2	39.9405
1.1 KMS.	60.000	9259.37	30378.5	6380473.00	20933310.2	41.8902
	62.307	10000.06	32809.5	6381215.00	20935744.5	43.1809
0. MAXI MUN.	64.000	10558.62	34641.2	6381774.69	20937580.7	44.2015
	67.708	11827.37	38803.7	6383046.00	20941751.7	46.6283
	68.000	11930.00	39140.4	6383148.81	20942089.0	46.8294
14 KMS.	72.000	13372.69	43873.6	6384594.94	20946833.7	49.6952
	73.680	14000.06	45932.0	6385223.81	20948896.7	50.9472
	76.000	14886.59	48840.8	6386112.81	20951813.5	52.7034
	80.000	16471.62	54040.8	6387702.31	20957028.5	55.7534
	84.000	18126.97	59471.4	6389362.75	20962476.0	58.7470
	88.000	19850.62	65126.7	6391092.44	20968151.0	61.6012
	92.000	21640.44	70998.8	6392889.94	20974045.0	64.2636
	96.000	23492.75	77076.0	6394748.87	20980147.0	66.7067
	100.000	25403.81	83345.8	6396668.37	20986444.7	68.9226
	104.000	27369.31	89794.3	6398643.25	20992924.0	70.9165
	108.000	29384.31	96405.2	6400668.75	20999569.2	72.7008

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)
(Continued)

MDC/HCR T=90.0 FUEL 3084K+524K (40K PAYLOAD)

TIME SEC	ALTITUDE		RADIUS		INCL	
	M	FT	M	FT	DEG	DEG
112.000	31444.25	103163.5	6402740.19	21006365.2	74.2941	
116.000	33543.97	110052.1	6404852.44	21013295.2	75.7163	
120.000	35678.37	117055.0	6407000.62	21020343.0	76.9869	
124.000	37843.00	124156.8	6409180.19	21027494.0	78.1238	
128.000	40032.00	131341.9	6411386.37	21034732.0	79.1435	
132.000	42243.87	138595.4	6413614.75	21042043.0	80.0606	
136.000	44471.06	145902.4	6415960.75	21049411.7	80.3806	
140.000	46707.31	153230.2	6418117.12	21056814.5	81.6038	
144.000	48944.56	160579.3	6420375.87	21064225.2	82.2454	
148.000	51175.37	167898.2	6422629.56	21071619.2	82.8178	
152.000	53392.82	175172.7	6424871.06	21078973.2	83.3312	
156.000	55590.06	182382.1	6427094.00	21086266.2	83.7939	
160.000	57761.50	19506.2	6429232.37	21093478.7	84.2127	
164.000	59901.25	196526.4	6431460.37	21100591.7	84.5934	
168.000	62004.06	203425.4	6433592.94	21107588.2	84.9408	
172.000	64065.37	210188.2	6435685.19	21114452.5	85.2589	
176.000	66080.37	216799.1	6437732.56	21121169.7	85.5512	
180.000	68045.12	223245.2	6439731.00	21127726.2	85.8202	
184.000	69955.81	229513.3	6441676.75	21134110.0	86.0697	
188.000	71909.37	235593.4	6443566.19	21140308.7	86.3005	
192.000	73501.25	241473.9	6445396.25	21146313.0	86.5150	
196.000	75329.94	247145.5	6447163.94	21152112.5	86.7149	
199.156	76230.19	250112.2	6448089.81	21155150.2	86.8170	
198.156	76234.19	250112.2	6448089.81	21155150.2	86.8170	
201.000	76086.25	252579.6	6448860.50	21157678.7	86.8170	
204.000	78525.51	257629.6	6450440.06	21162861.0	86.8170	
208.030	79939.25	262257.9	6451894.00	21167631.0	86.8171	
208.156	79991.75	262440.1	6451948.12	21167808.7	86.8171	
208.156	79991.75	262440.1	6451948.12	21167808.7	86.8171	
212.000	81259.94	266597.6	6453254.19	21172093.7	86.9074	
220.000	93727.44	274696.3	6455865.50	21180464.0	87.0903	
224.000	95972.62	282062.4	6458135.94	21188110.0	87.2669	
236.000	87999.75	288713.1	6460750.87	21195044.7	87.4375	

SEPARATION

009 IGNITION
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Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR 1-90.0 FUEL 3064K+524K (40K PAYLOAD)

TIME SEC	ALTITUDE		RADIUS		INCL DEG
	M	FT	M	FT	
244.000	89814.56	294667.2	6462156.12	21201299.5	87.6024
252.000	91423.31	299945.2	6463857.94	21206882.7	87.7618
260.000	92832.50	304568.6	6465362.94	21211820.5	87.9162
268.000	94049.44	308551.1	6466878.44	21216136.5	88.0657
276.000	95081.81	311909.2	6467812.25	21219856.2	88.2105
284.000	95937.87	314756.3	6468772.62	21223007.2	88.3510
292.000	96626.87	317017.3	6469566.81	21225619.2	88.4874
300.000	97158.50	318761.5	6470210.69	21227725.2	88.6198
308.000	97593.62	320025.0	6470709.12	21229360.5	88.7485
316.000	97794.06	320846.7	6471075.94	21230564.0	88.8736
324.000	97922.50	321268.0	6471324.00	21231377.7	88.9954
332.000	97993.31	321336.3	6471467.62	21231849.0	89.1140
340.000	97871.81	321101.7	6471522.25	21232028.2	89.2297
348.000	97725.25	320520.9	6471505.19	21231972.2	89.3427
356.000	97522.44	319955.5	6471435.37	21231743.2	89.4522
364.000	97279.81	319159.5	6471329.00	21231394.2	89.5546
372.000	97010.69	318276.5	6471199.31	21230968.7	89.6498
380.000	96730.37	317356.9	6471061.31	21230516.0	89.7386
388.000	96455.37	316454.6	6470931.25	21230089.2	89.8214
396.000	96203.75	315629.1	6470827.06	21229747.5	89.8989
404.000	95995.37	314945.5	6470768.25	21229554.5	89.9720
407.301	95927.00	314721.1	6470752.12	21229534.2	90.0000
407.301	95927.00	314721.1	6470762.12	21229534.2	90.0000

INCL

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

WDC/HCR I=90.0 FUEL 3064K+524K (40K PAYLOAD)

	TIME SEC	MACH	DYN. N/(%)SQ	PRESSURE LB/(FT)SQ	ALFP DEG	DRAG N	LBS
LIFT-OFF							
	0.000	0.000	0.000	0.000	-92.013	56479.958	12697.199
	4.000	0.000	0.000	0.000	-92.013	56479.958	12697.199
	8.000	0.000	180.121	3.762	0.000	16901.184	3799.537
	12.000	0.000	747.287	15.607	0.001	66990.043	15059.960
	16.000	0.000	1730.733	36.147	0.001	66990.043	15059.960
	20.000	0.000	3147.133	65.646	-0.645	147537.916	33167.842
	24.000	0.000	4979.730	104.004	-0.583	253393.996	56965.235
	28.000	0.000	7215.891	150.707	-0.271	377139.047	84784.229
	32.000	0.000	9907.294	204.929	-0.271	377139.047	84784.229
	36.000	0.000	12681.845	264.866	0.000	509184.887	114469.313
	40.000	0.000	15744.987	328.841	0.000	477832.977	145638.643
	44.000	0.000	18880.672	394.331	0.000	831614.914	186954.465
	48.000	0.000	21941.299	458.254	0.000	1055584.359	237304.799
	52.000	0.000	24741.311	516.733	0.000	1371175.062	308252.410
	56.000	0.000	27069.208	565.352	0.000	1779737.047	400100.793
	60.000	0.000	28805.843	601.623	0.000	2550553.875	573387.305
	64.000	0.000	30011.926	626.812	0.000	3451209.656	775862.773
	68.000	0.000	30522.479	637.475	0.000	4417068.687	992996.523
	72.000	0.000	30804.325	643.362	0.000	4601674.687	1034497.602
	76.000	0.000	31101.029	649.559	0.000	4638401.625	1020273.250
	80.000	0.000	31099.042	649.517	0.000	4474112.000	1005820.367
	84.000	0.000	30661.660	640.382	0.000	4264405.500	958676.469
	88.000	0.000	30231.137	631.390	0.000	4243199.477	953909.156
	92.000	0.000	29387.356	613.768	0.000	3887635.406	873975.187
	96.000	0.000	27279.677	569.748	0.000	3704344.094	832769.664
	100.000	0.000	24367.665	508.929	0.000	3424352.625	769825.078
	104.000	0.000	21484.476	448.713	0.000	2892720.125	650309.336
	108.000	0.000	18806.311	392.778	0.000	2432116.625	546559.227
	112.000	0.000	16366.474	341.821	0.000	2025559.016	455363.770
	116.000	0.000	14173.967	296.029	0.000	1663643.016	374001.820
	120.000	0.000	12216.805	255.153	0.000	1346153.141	302627.258
	124.000	0.000	10432.209	217.881	0.000	1071427.687	240866.520
	128.000	0.000			0.000	854106.289	192909.963
	132.000	0.000			0.000	692279.750	155630.676

10 KMS.

0 MAXIMUM

14 KMS.

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR I=90.0 FUEL 30644+524K (40K PAYLOAD)

TIME SEC	MACH	QYN. N/(M)SQ	PRESSURE LB/(FT)SQ	ALFP DEG	N	DRAG	LRS
112.000	3.5802	8835.233	184.529	.000	551429.516	123966.284	
116.000	3.4144	7447.518	155.545	.000	434661.469	97715.783	
120.000	4.0619	6254.775	130.634	.000	341312.309	76730.058	
124.000	4.3109	5241.478	109.471	.000	271106.562	60947.178	
128.000	4.5665	4390.443	91.696	.000	214224.615	48168.601	
132.000	4.8312	3682.775	76.916	.000	168590.080	37900.557	
136.000	5.1054	3094.663	64.633	.000	134349.139	30202.887	
140.000	5.3879	2607.502	54.775	.000	109985.211	24725.658	
144.000	5.6863	2196.658	45.878	.000	90088.839	20252.776	
148.000	5.9940	1881.534	39.298	.000	74392.700	16724.144	
152.000	6.4208	1607.269	33.569	.000	61036.292	13721.514	
156.000	6.8145	1367.789	28.567	.000	49692.937	11171.417	
160.000	7.2354	1159.278	24.212	.000	41247.022	9272.902	
164.000	7.6702	979.403	20.434	.000	34812.266	7826.109	
168.000	8.1215	822.241	17.173	.000	29255.894	6576.986	
172.000	8.5878	688.142	14.372	.000	24494.573	5504.351	
176.000	9.0672	573.740	11.983	.000	20414.082	4580.268	
180.000	9.5583	476.783	9.958	.000	16964.375	3813.743	
184.000	10.0593	395.190	8.254	.000	14061.121	3161.066	
188.000	10.5692	326.937	6.829	.000	11634.702	2615.605	
192.000	11.0871	270.381	5.647	.000	9620.360	2162.743	
196.000	11.6128	223.671	4.671	.000	7958.371	1789.113	
198.156	11.8993	202.067	4.220	.000	7189.670	1616.302	
198.156	11.8993	202.067	4.220	.000	.000	.000	
200.000	11.9953	179.682	3.753	.000	.000	.000	
204.000	12.0557	140.772	2.940	.000	.000	.000	
208.000	12.1733	112.021	2.340	.000	.000	.000	
208.156	12.1774	111.066	2.320	.000	.000	.000	
208.156	12.1774	111.066	2.320	.000	.000	.000	
212.000	.0000	.0000	.000	.000	.000	.000	
220.000	.0000	.0000	.000	.000	.000	.000	
228.000	.0000	.0000	.000	.000	.000	.000	
236.000	.0000	.0000	.000	.000	.000	.000	

SEPARATION

ORB IGNITION
BEGIN MIN-H

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR I=90.0 FUEL 3064K+524K (40K PAYLOAD)

TIME SFC	MACH	QVE. PRESSURE N/(M)SQ	ALFP LB/(FT)SQ	ALFP DEG	N	DRAW	LBS
244.000	.0000	.000	.000	10.248	.000	.000	.000
252.000	.0000	.000	.000	10.080	.000	.000	.000
260.000	.0000	.000	.000	9.977	.000	.000	.000
268.000	.0000	.000	.000	9.841	.000	.000	.000
276.000	.0000	.000	.000	9.775	.000	.000	.000
284.000	.0000	.000	.000	9.680	.000	.000	.000
292.000	.0000	.000	.000	9.757	.000	.000	.000
300.000	.0000	.000	.000	8.910	.000	.000	.000
308.000	.0000	.000	.000	8.038	.000	.000	.000
316.000	.0000	.000	.000	7.645	.000	.000	.000
324.000	.0000	.000	.000	7.230	.000	.000	.000
332.000	.0000	.000	.000	6.796	.000	.000	.000
340.000	.0000	.000	.000	6.345	.000	.000	.000
348.000	.0000	.000	.000	5.877	.000	.000	.000
356.000	.0000	.000	.000	5.395	.000	.000	.000
364.000	.0000	.000	.000	4.909	.000	.000	.000
372.000	.0000	.000	.000	4.420	.000	.000	.000
380.000	.0000	.000	.000	3.929	.000	.000	.000
388.000	.0000	.000	.000	3.436	.000	.000	.000
396.000	.0000	.000	.000	2.941	.000	.000	.000
404.000	.0000	.000	.000	2.444	.000	.000	.000
407.301	.0000	.000	.000	2.239	.000	.000	.000
437.301	.0000	.000	.000	2.239	.000	.000	.000

INJECTION

Table C-4. Trajectory Tables for the Mission with an Inclination of 90° and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCP T=90.0 FUEL 30644+524K (40K PAYLOAD)

	TIME SEC	AZ-S DEG	LATITUDE DEG	LONGITUDE DEG	CHIP DEG	CHIY DEG	CHIR DEG
LIFT-OFF	0.000	90.0000	34.720	-117.883	.000	.000	182.099
	4.000	89.000	34.720	-117.883	.000	.000	182.099
	8.000	89.000	34.720	-117.883	.000	.000	182.099
	12.000	89.000	34.720	-117.883	.000	.000	182.099
	16.000	89.000	34.720	-117.883	.000	.000	182.099
	20.000	89.000	34.720	-117.883	.000	.000	182.099
	24.000	89.000	34.720	-117.883	.000	.000	182.099
	28.000	89.000	34.720	-117.883	.000	.000	182.099
	32.000	89.000	34.720	-117.883	.000	.000	182.099
	36.000	89.000	34.720	-117.883	.000	.000	182.099
	40.000	89.000	34.720	-117.883	.000	.000	182.099
	44.000	89.000	34.720	-117.883	.000	.000	182.099
	48.000	89.000	34.720	-117.883	.000	.000	182.099
	52.000	89.000	34.720	-117.883	.000	.000	182.099
	56.000	89.000	34.720	-117.883	.000	.000	182.099
	60.000	89.000	34.720	-117.883	.000	.000	182.099
	64.000	89.000	34.720	-117.883	.000	.000	182.099
	68.000	89.000	34.720	-117.883	.000	.000	182.099
	72.000	89.000	34.720	-117.883	.000	.000	182.099
	76.000	89.000	34.720	-117.883	.000	.000	182.099
	80.000	89.000	34.720	-117.883	.000	.000	182.099
	84.000	89.000	34.720	-117.883	.000	.000	182.099
	88.000	89.000	34.720	-117.883	.000	.000	182.099
	92.000	89.000	34.720	-117.883	.000	.000	182.099
	96.000	89.000	34.720	-117.883	.000	.000	182.099
	100.000	89.000	34.720	-117.883	.000	.000	182.099
	104.000	89.000	34.720	-117.883	.000	.000	182.099
	108.000	89.000	34.720	-117.883	.000	.000	182.099

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

WDC/HCR I=90.0 FUEL 3064K+524K (40K PAYLOAD)

TIME SEC	AZ.S DEG	LATITUDE DEG	LONGITUDE DEG	CHIP DEG	CHV DEG	CHIR DEG
112.000	160.834	34.460	-117.900	-61.967	.000	182.099
116.000	162.546	34.424	-117.902	-63.688	.000	182.099
120.000	164.167	34.384	-117.905	-65.329	.000	182.099
124.000	165.557	34.341	-117.907	-66.864	.000	182.099
128.000	166.822	34.295	-117.910	-68.311	.000	182.099
132.000	167.949	34.245	-117.913	-69.675	.000	182.099
136.000	169.053	34.191	-117.917	-70.963	.000	182.099
140.000	169.840	34.133	-117.920	-72.180	.000	182.099
144.000	170.625	34.071	-117.924	-73.333	.000	182.099
148.000	171.326	34.005	-117.926	-74.420	.000	182.099
152.000	171.954	33.935	-117.933	-75.472	.000	182.099
156.000	172.520	33.861	-117.937	-76.466	.000	182.099
160.000	173.032	33.783	-117.942	-77.415	.000	182.099
164.000	173.497	33.701	-117.947	-78.325	.000	182.099
168.000	173.921	33.615	-117.952	-79.196	.000	182.099
172.000	174.310	33.525	-117.958	-80.027	.000	182.099
176.000	174.667	33.431	-117.964	-80.825	.000	182.099
180.000	174.995	33.333	-117.970	-81.587	.000	182.099
184.000	175.300	33.231	-117.976	-82.351	.000	182.099
188.000	175.581	33.125	-117.983	-83.060	.000	182.099
192.000	175.843	33.015	-117.990	-83.761	.000	182.099
196.000	176.106	32.900	-117.997	-84.431	.000	182.099
200.000	176.211	32.837	-118.001	-84.782	.000	182.099
204.000	176.213	32.782	-118.004	-85.080	.000	182.099
208.000	176.218	32.664	-118.012	-85.728	.000	182.099
212.000	176.223	32.545	-118.019	-86.377	.000	182.099
216.000	176.224	32.541	-118.019	-86.402	.000	182.099
220.000	176.224	32.541	-118.019	-85.934	.000	182.099
224.000	176.224	32.541	-118.019	-85.934	.000	182.099
228.000	176.224	32.541	-118.019	-85.934	.000	182.099
232.000	176.224	32.541	-118.019	-85.934	.000	182.099
236.000	176.224	32.541	-118.019	-85.934	.000	182.099

SEPARATION

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Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR I=90.0 FUEL 3064K+524K (40K PAYLOAD)

TIME SEC	AZ.S DEG	LATITUDE DEG	LONGITUDE DEG	CHP DEG	CHIY DEG	CHIR DEG
244.000	177.191	31.394	-118.092	-79.978	.000	182.099
252.000	177.386	31.113	-118.110	-80.894	.000	182.099
260.000	177.573	30.823	-118.128	-81.810	.000	182.099
268.000	177.754	30.523	-118.147	-82.741	.000	182.099
276.000	177.929	30.212	-118.167	-83.671	.000	182.099
284.000	178.099	29.891	-118.188	-84.606	.000	182.099
292.000	178.261	29.558	-118.209	-85.545	.000	182.099
300.000	178.419	29.213	-118.231	-86.489	.000	182.099
308.000	178.571	28.856	-118.254	-87.437	.000	182.099
316.000	178.718	28.487	-118.277	-88.389	.000	182.099
324.000	178.861	28.104	-118.301	-89.345	.000	182.099
332.000	178.999	27.707	-118.327	-90.304	.000	182.099
340.000	179.133	27.296	-118.352	-91.268	.000	182.099
348.000	179.263	26.869	-118.379	-92.234	.000	182.099
356.000	179.388	26.426	-118.407	-93.204	.000	182.099
364.000	179.505	25.967	-118.435	-94.177	.000	182.099
372.000	179.612	25.490	-118.465	-95.152	.000	182.099
380.000	179.712	24.998	-118.495	-96.130	.000	182.099
388.000	179.804	24.488	-118.526	-97.111	.000	182.099
396.000	179.889	23.962	-118.558	-98.093	.000	182.099
404.000	179.970	23.419	-118.590	-99.077	.000	182.099
407.301	180.000	23.191	-118.604	-99.484	.000	182.099
407.301	180.000	23.191	-118.604	-99.484	.000	182.099
INJECTION						

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR 1=90.0 FUEL 30F4K+524K (40K PAYLOAD)

	TIME SEC	RANGE KM	RANGE ANG. DEG	TOTAL ALPHA DEG	IMP. LAT. DEG	IMP. LONG. DEG
LIFT-OFF	0.000	0.000	0.000	0.000	34.720	-117.883
	4.000	0.000	0.000	0.000	34.720	-117.883
	8.000	0.000	0.014	0.000	34.720	-117.890
BEGIN TILT	8.000	0.000	0.027	0.001	34.720	-117.896
	12.000	0.000	0.041	0.001	34.720	-117.886
	16.000	0.006	0.055	-0.545	34.719	-117.885
	20.000	0.023	0.069	-0.271	34.719	-117.884
END TILT	24.000	0.057	0.082	-0.271	34.719	-117.884
	28.000	0.115	0.096	0.130	34.716	-117.884
	32.000	0.205	0.110	0.149	34.714	-117.884
	36.000	0.339	0.123	0.167	34.710	-117.884
	40.000	0.527	0.137	0.185	34.704	-117.884
	44.000	0.781	0.151	0.202	34.680	-117.886
	48.000	1.114	0.165	0.219	34.670	-117.888
	52.000	1.537	0.178	0.235	34.645	-117.888
	56.000	2.062	0.192	0.252	34.617	-117.891
10 KMS.	60.000	2.700	0.206	0.268	34.583	-117.893
	62.307	3.125	0.214	0.277	34.561	-117.895
0 MAXIMUM	64.000	3.466	0.220	0.283	34.542	-117.896
	67.709	4.302	0.234	0.295	34.497	-117.899
	68.600	4.773	0.235	0.296	34.493	-117.899
	72.000	5.441	0.249	0.306	34.436	-117.903
14 KMS.	73.680	5.941	0.256	0.311	34.400	-117.905
	76.000	6.686	0.265	0.316	34.368	-117.908
	80.000	8.126	0.280	0.323	34.290	-117.913
	84.000	9.792	0.297	0.329	34.200	-117.920
	88.000	11.671	0.315	0.334	34.098	-117.927
	92.000	13.814	0.333	0.338	33.983	-117.934
	96.000	16.227	0.352	0.341	33.855	-117.943
	100.000	18.929	0.375	0.344	33.713	-117.953
	104.000	21.937	0.399	0.346	33.558	-117.963
	108.000	25.267	0.425	0.349	33.390	-117.975

Table C-4. Trajectory Tables for (continued) Mission with an Inclination of 90°
 WDC ASD P-9047890 P-50684143 * 694 kg (4000 lbs)

	TIME SEC	RANGE KM	RANGE ANG. DEG	TOTAL ALPHA DEG	IMP. LAT. DEG	IMP. LONG. DEG
	112.000	28.935	.453	.350	33.208	-117.987
	116.000	32.957	.484	.352	33.012	-118.000
	120.000	37.348	.519	.353	32.801	-118.014
	124.000	42.124	.556	.355	32.577	-118.029
	128.000	47.301	.596	.356	32.337	-118.045
	132.000	52.892	.641	.357	32.083	-118.062
	136.000	58.914	.689	.358	31.815	-118.080
	140.000	65.372	.741	.360	31.540	-118.098
	144.000	72.268	.797	.363	31.259	-118.117
	148.000	79.605	.857	.366	30.969	-118.136
	152.000	87.386	.922	.369	30.674	-118.155
	156.000	95.612	.991	.372	30.373	-118.175
	160.000	104.283	1.063	.375	30.068	-118.195
	164.000	113.403	1.141	.379	29.757	-118.215
	168.000	122.972	1.222	.383	29.442	-118.235
	172.000	132.990	1.308	.387	29.123	-118.255
	176.000	143.460	1.398	.391	28.799	-118.276
	180.000	154.381	1.492	.395	28.472	-118.297
	184.000	165.755	1.590	.400	28.141	-118.317
	188.000	177.582	1.693	.404	27.806	-118.338
	192.000	189.863	1.800	.408	27.468	-118.359
	196.000	202.598	1.911	.413	27.127	-118.380
SEPARATION	198.156	209.649	1.973	.415	26.941	-118.392
	200.000	215.738	2.026	.424	26.941	-118.392
	204.000	228.940	2.142	.442	26.941	-118.392
	208.000	242.136	2.259	.461	26.941	-118.392
ORR IGNITION	208.156	242.649	2.263	.462	26.941	-118.392
BEGIN MIN-H	209.156	242.649	2.263	.462	26.941	-118.392
	212.000	255.433	2.376	12.248	26.941	-118.392
	220.000	282.715	2.617	12.204	26.739	-118.405
	224.000	310.940	2.967	12.089	26.304	-118.433
	236.000	340.139	3.126	11.947	25.855	-118.462
				11.763	25.389	-118.492

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR I=90.0 FUEL 3054K+524K (40K PAYLOAD)

TIME SEC	RANGE KM	RANGE ANG. DEG	TOTAL ALPHA DEG	IMP. LAT. DEG	IMP. LONG. DEG
244.000	370.346	3.394	11.554	24.903	-118.523
252.000	401.596	3.672	11.317	24.397	-118.555
260.000	433.926	3.960	11.052	23.867	-118.588
269.000	467.377	4.258	10.760	23.313	-118.623
276.000	501.000	4.567	10.444	22.725	-118.660
284.000	537.811	4.886	10.105	22.105	-118.699
292.000	574.887	5.217	9.743	21.444	-118.739
300.000	613.270	5.560	9.360	20.736	-118.783
308.000	653.016	5.915	8.959	19.972	-118.829
316.000	694.182	6.282	8.539	19.137	-118.880
324.000	736.834	6.663	8.103	18.217	-118.936
332.000	781.041	7.059	7.652	17.185	-118.998
340.000	826.678	7.468	7.187	15.998	-119.068
348.000	874.427	7.893	6.711	14.632	-119.150
356.000	923.777	8.335	6.227	12.970	-119.248
364.000	974.975	8.793	5.746	10.977	-119.365
372.000	1028.026	9.267	5.271	8.479	-119.512
380.000	1082.932	9.759	4.803	5.127	-119.709
388.000	1139.693	10.266	4.346	0.062	-120.006
396.000	1198.311	10.791	3.903	-9.634	-120.576
404.000	1258.785	11.332	3.479	-54.223	-123.200
407.301	1254.277	11.561	3.312	-54.223	-123.200
407.301	1254.277	11.561	3.312	-54.223	-123.200

INJECTION

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)
(Continued)

WDC/MCR I=90.0 FUEL 3064K+524K (40K PAYLOAD)

TIME SEC	AERO HEATING-INDIC.		ALPHA 0		DFS. NODE DEG
	N-W/41150	LB-FI/41150	N*RAD	LB*DEG	
LIFT-OFF	.000	.0	.000	.000	90.000
	.000	.0	.000	.000	90.000
4.000	1978.3	135.6	.001	.008	90.031
8.000	33247.7	2278.2	.009	.119	90.063
BEGIN TILT	8.000	33247.7	.009	.119	90.063
12.000	175139.5	12000.9	-19.495	-251.101	89.910
16.000	574323.4	39353.7	-31.980	-411.919	89.379
20.000	1451817.0	99481.1	-23.547	-303.294	88.459
END TILT	20.000	1451817.0	-23.547	-303.294	88.459
24.000	3109872.1	213093.9	13.757	177.196	87.173
28.000	5912495.6	405134.6	22.195	285.890	85.341
32.000	10293881.6	705454.9	32.966	424.624	82.886
36.000	16734269.2	1146661.7	45.959	591.981	79.758
40.000	25734947.7	1763404.0	60.875	784.106	75.946
44.000	37771985.0	2588703.1	77.207	994.476	71.501
48.000	53236630.0	3647867.9	94.224	1213.665	66.558
52.000	72313016.0	4955015.5	110.979	1429.473	61.328
56.000	94965216.0	6507184.2	126.564	1630.226	56.023
60.000	121012081.0	8291961.4	140.387	1808.274	50.770
62.302	137550236.0	9425226.0	147.399	1898.590	47.788
64.000	150388448.0	10304881.9	151.977	1957.556	45.639
67.708	180537782.0	12370767.5	159.930	2059.996	41.101
68.000	183027468.0	12541365.2	160.394	2065.974	40.755
72.000	218582114.0	14972673.4	164.006	2112.494	36.220
74.680	234228716.0	16049765.0	163.841	2110.366	34.434
76.000	256349386.0	17565512.2	161.868	2084.960	32.092
80.000	295294432.0	20234095.5	153.779	1990.767	28.394
84.000	334155392.0	22896917.2	139.883	1801.774	25.127
88.000	371688200.0	25468731.5	125.130	1611.755	22.273
92.000	407684768.0	27935275.7	110.819	1427.414	19.796
96.000	441930944.0	30281888.5	97.368	1254.159	17.652
100.000	474282664.0	32498685.5	84.998	1094.832	15.796
104.000	504639424.0	34578784.0	73.760	950.076	14.189
108.000	532879428.0	36513838.5	63.362	816.142	12.793

Table C-4. Trajectory Tables for the Mission with an Inclination of 90° and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR I=90.0 FUEL 30F4K+524K (40K PAYLOAD)

TIME SEC	AERO HEATING INDC. LR-ET/(FT)SQ	N-M/(M)SQ	ALPHA Q		DES. NODE DEG
			N*RAD	LB*DEG	
112.000	558834704.0	38292340.0	53.950	694.908	11.577
115.000	582493608.0	39913490.0	45.696	588.592	10.514
120.000	603922592.0	41381942.0	38.547	496.510	9.579
124.000	623234688.0	42705141.0	32.434	417.765	8.755
128.000	640580856.0	43893731.0	27.270	351.248	8.023
132.000	656139288.0	44959922.5	22.953	295.650	7.372
136.000	670094080.0	45916029.0	19.362	249.392	6.795
140.000	682586408.0	46772025.5	16.376	218.937	6.298
144.000	692555664.0	47537362.5	13.909	179.152	5.845
148.000	7003904496.0	48225926.0	12.004	154.623	5.450
152.000	712879584.0	48847795.0	10.340	133.190	5.098
156.000	721025968.0	49406040.5	8.879	114.369	4.782
160.000	728294824.0	49904046.5	7.597	97.856	4.498
164.000	734738800.0	50345599.5	6.475	83.406	4.240
168.000	740417088.0	50734685.5	5.497	70.807	4.007
172.000	745391040.0	51075510.0	4.649	59.876	3.793
176.000	749723640.0	51372787.5	3.917	50.449	3.599
180.000	753478464.0	51629674.5	3.289	42.370	3.420
184.000	756718424.0	51851682.0	2.756	35.496	3.255
188.000	759504320.0	52042576.5	2.305	29.686	3.104
192.000	761893960.0	52206319.0	1.926	24.810	2.963
196.000	763941024.0	52346587.5	1.610	20.743	2.833
198.156	764919576.0	52413639.5	1.463	18.847	2.767
200.000	765676696.0	52485519.0	1.328	18.847	2.767
204.000	767047408.0	52559442.5	1.087	14.003	2.767
208.000	768128120.0	52633495.0	.902	11.618	2.767
208.156	768165424.0	52636051.0	.836	11.538	2.767
208.156	768165424.0	52636051.0	.896	11.538	2.767
212.000	768165424.0	52636051.0	23.743	305.821	2.767
212.000	768165424.0	52636051.0	.000	.000	2.709
216.000	768165424.0	52636051.0	.000	.000	2.593
220.000	768165424.0	52636051.0	.000	.000	2.482
224.000	768165424.0	52636051.0	.000	.000	2.376

SEPARATION

ORR IGNITION
BEGIN MIN-H

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

WDC/MCR I=90-U FUEL 3064K+524K (40K PAYLOAD)

TIME SEC	AERO HEATING INDIC. N-M/(M)SQ	LB-FI/(FT)SQ	N*RAD	ALPHA Ø LB*DEG	DPS. NODE DEG
244.000	768165424.0	52636051.0	.000	.000	2.275
252.000	768165424.0	52636051.0	.000	.000	2.178
260.000	768165424.0	52636051.0	.000	.000	2.085
268.000	768165424.0	52636051.0	.000	.000	1.998
276.000	768165424.0	52636051.0	.000	.000	1.911
284.000	768165424.0	52636051.0	.000	.000	1.830
292.000	768165424.0	52636051.0	.000	.000	1.752
300.000	768165424.0	52636051.0	.000	.000	1.677
308.000	768165424.0	52636051.0	.000	.000	1.606
316.000	768165424.0	52636051.0	.000	.000	1.537
324.000	768165424.0	52636051.0	.000	.000	1.472
332.000	768165424.0	52636051.0	.000	.000	1.409
340.000	768165424.0	52636051.0	.000	.000	1.349
348.000	768165424.0	52636051.0	.000	.000	1.291
356.000	768165424.0	52636051.0	.000	.000	1.236
364.000	768165424.0	52636051.0	.000	.000	1.186
372.000	768165424.0	52636051.0	.000	.000	1.140
380.000	768165424.0	52636051.0	.000	.000	1.098
388.000	768165424.0	52636051.0	.000	.000	1.060
396.000	768165424.0	52636051.0	.000	.000	1.025
404.000	768165424.0	52636051.0	.000	.000	.993
407.301	768165424.0	52636051.0	.000	.000	.981
407.331	768165424.0	52636051.0	.000	.000	.981

INJECTION

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR T=90.0 FUEL 3064K+524K (40K PAYLOAD)

	TIME SEC	APOLLO 13 POSITION				COORDINATES			
		M	X	FT	M	Y	FT	M	Z
LIFT-OFF	0.000	6371173.4	20902799.7	-734.4	-2409.5	20041.7	65753.5		
	1.000	6371173.4	20902799.7	-734.4	-2409.5	20041.7	65753.5		
	4.000	6371207.8	20902912.5	-2260.9	-7417.6	19985.6	65569.5		
	8.000	6371313.5	20903259.2	-3787.4	-12425.7	19929.3	65384.7		
BFGIN TILT	12.000	6371313.5	20903259.2	-3787.4	-12425.7	19929.3	65384.7		
	16.000	6371493.5	20903950.0	-5313.8	-17433.7	19873.6	65202.2		
	20.000	6371751.2	20904695.5	-6400.1	-22441.3	19823.4	65037.5		
	24.000	6372099.8	20905905.2	-8366.3	-27448.4	19784.5	64909.7		
END TILT	28.000	6372099.8	20905905.2	-8366.3	-27448.4	19784.5	64909.7		
	32.000	6372512.5	20907193.0	-9992.2	-32454.8	19762.4	64837.3		
	36.000	6373022.5	20908666.2	-11418.0	-37460.5	19744.2	64843.1		
	40.000	6373622.7	20910435.7	-12943.4	-42465.2	19798.8	64956.8		
10 KMS.	44.000	6374315.7	20913100.2	-14468.5	-47469.0	19876.5	65211.7		
	48.000	6375103.0	20915692.0	-15993.3	-52471.6	20008.5	65644.8		
	52.000	6375985.0	20918585.7	-17517.8	-57472.9	20206.9	66295.7		
	56.000	6376900.3	20921745.7	-19041.7	-62472.9	20484.1	67204.9		
14 KMS.	60.000	6377824.4	20925276.7	-20565.3	-67471.4	20851.9	68411.7		
	64.000	6379170.6	20929037.0	-22098.3	-72469.2	21321.9	69953.6		
	68.000	6380391.8	20933043.7	-23610.8	-77463.3	21905.4	71868.2		
	72.000	6381129.1	20935452.7	-24988.7	-80343.5	22298.9	73159.3		
18 KMS.	76.000	6381685.2	20937727.5	-25132.7	-82456.5	22616.4	74200.7		
	80.000	6382949.0	20941430.2	-26542.9	-87093.1	23403.0	76781.4		
	84.000	6383050.1	20941765.2	-26654.1	-87447.7	23470.6	77003.3		
	88.000	6384485.9	20945475.7	-28174.7	-92435.8	24484.9	80331.2		
22 KMS.	92.000	6385110.1	20948592.7	-28813.2	-94531.6	24963.0	81899.7		
	96.000	6385992.2	20951418.0	-29694.7	-97423.7	25677.4	84243.4		
	100.000	6387568.6	20956590.6	-31214.0	-102408.2	27066.8	88801.9		
	104.000	6389214.6	20961990.0	-32732.5	-107390.2	28672.7	94070.7		
26 KMS.	108.000	6390927.6	20967611.2	-34250.3	-112369.6	30514.5	100113.1		
	112.000	6392705.8	20973444.0	-35767.2	-117345.4	32610.9	106991.0		
	116.000	6394544.6	20979477.0	-37283.2	-122320.3	34980.3	114764.9		
	120.000	6396491.1	20985695.5	-38798.4	-127291.2	37640.9	123493.9		
30 KMS.	124.000	6398387.5	20992084.7	-40312.6	-132259.1	40610.2	133235.6		
	128.000	6400381.6	20998627.2	-41825.8	-137223.7	43905.1	144045.5		

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR I=90.0 FUEL 30E4K+524K (40K PAYLOAD)

TIME SEC	APOLLO			POSITION			COORDINATES			Z
	M	X	FT	M	Y	FT	M	FT	FT	
112.000	6402417.1	21005305.2	-4338.0	-142185.1	47541.9	155977.5				
116.000	6404488.1	21012100.0	-44849.2	-147143.1	51536.9	169084.5				
120.000	6406599.1	21018992.7	-46359.3	-152097.5	55906.1	183419.0				
124.000	6408714.4	21025965.7	-47868.3	-157048.2	60665.2	199032.9				
128.000	6410858.3	21032999.5	-49376.1	-161995.2	65830.1	215978.0				
132.000	6413015.3	21040036.2	-50882.8	-166938.3	71416.6	234306.5				
136.000	6415179.6	21047177.0	-52388.2	-171877.4	77439.7	254067.1				
140.000	6417342.4	21054273.0	-53892.4	-176812.4	83906.0	275282.2				
144.000	6419494.6	21061334.0	-55395.3	-181743.1	90818.7	297961.5				
148.000	6421627.1	21068330.2	-56896.9	-186669.5	98180.3	322113.8				
152.000	6423731.4	21075234.0	-58397.1	-191691.4	105993.2	347746.7				
156.000	6425799.2	21082018.5	-59895.9	-196508.8	114259.4	374866.8				
160.000	6427822.9	21088657.7	-61393.3	-201421.4	122980.7	403480.1				
164.000	6429794.9	21095127.5	-62889.2	-206329.3	132158.8	433591.7				
168.000	6431708.1	21101404.2	-64383.6	-211232.2	141794.8	465206.0				
172.000	6433555.4	21107465.0	-65876.5	-216130.2	151890.0	498326.8				
176.000	6435330.2	21113287.7	-67367.8	-221022.9	162445.4	532957.4				
180.000	6437026.2	21118852.2	-68857.5	-225910.5	173461.9	569100.7				
184.000	6438637.2	21124137.5	-70345.6	-230792.6	184940.1	608758.8				
188.000	6440157.2	21129124.5	-71832.0	-235669.3	196880.6	645933.8				
192.000	6441580.4	21133790.0	-73316.7	-240540.4	209294.0	686627.1				
196.000	6442901.4	21138127.7	-74799.7	-245405.8	222150.4	728840.1				
198.156	6443568.9	21140319.0	-75598.1	-248025.4	229276.5	752219.6				
198.156	6443568.9	21140318.0	-75598.1	-248025.4	229276.5	752219.6				
200.000	6444110.2	21142093.7	-76280.9	-250265.4	235430.5	772409.9				
204.000	6445172.1	21145577.5	-77760.3	-255119.0	248773.3	816185.3				
208.000	6446080.7	21148558.7	-79237.8	-259965.7	262110.4	859942.1				
208.156	6446113.1	21148664.7	-79295.3	-260155.2	262629.2	861644.4				
208.156	6446113.1	21148664.7	-79295.3	-260155.2	262629.2	861644.4				
208.156	6446113.1	21148664.7	-79295.3	-260155.2	262629.2	861644.4				
212.000	6446863.4	21151126.5	-80713.5	-264809.2	275550.6	904037.3				
220.000	6448142.2	21155322.2	-83659.1	-274472.3	303131.2	944525.1				
228.000	6449032.2	21158242.2	-86596.9	-284110.5	331669.4	1088154.2				
236.000	6449524.5	21159857.2	-89526.4	-293721.9	361194.4	1185020.9				

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR I=90.0 FUEL 3054K+524K (40K PAYLOAD)

TIME SEC	APOLLO 13 POSITION COORDINATES				Z		
	M	X	FT	M	FT	M	FT
244.000	6449609.2	21160135.0	-92447.6	-303305.6	391737.0	1285226.3	
252.000	6449275.8	21159041.2	-95360.0	-312860.8	423329.9	1388877.5	
260.000	6448513.1	21156538.7	-98263.4	-322386.6	456007.5	1496087.5	
268.000	6447308.6	21152587.2	-101157.6	-331882.0	489806.4	1606976.3	
276.000	6445649.1	21147142.7	-104042.3	-341346.2	524765.3	1721671.0	
284.000	6443520.1	21140157.7	-106917.2	-350778.4	560925.7	1840307.5	
292.000	6440905.9	21131581.0	-109782.1	-360177.6	598331.7	1963030.4	
300.000	6437789.5	21121356.5	-112636.7	-369543.0	637030.3	2089994.6	
308.000	6434152.2	21109423.2	-115480.7	-378873.6	677072.5	2221366.4	
316.000	6429974.1	21095715.2	-118313.8	-388168.7	718512.7	2357325.2	
324.000	6425232.8	21080160.0	-121135.9	-397427.4	761410.0	2498064.3	
332.000	6419904.4	21062678.2	-123946.5	-406649.7	805828.4	2643794.0	
340.000	6413962.1	21043182.5	-126745.6	-415831.9	851837.6	2794742.8	
348.000	6407376.7	21021577.0	-129532.7	-424976.0	899513.9	2951161.1	
356.000	6400116.1	20997755.2	-132307.6	-434080.2	948939.1	3113317.3	
364.000	6392147.4	20971612.0	-135070.2	-443143.6	1000153.7	3281344.3	
372.000	6383439.3	20943042.2	-137820.0	-452165.4	1053152.7	3455225.5	
380.000	6373960.6	20911944.2	-140556.9	-461144.7	1107928.5	3634935.9	
388.000	6363680.3	20878216.0	-143280.6	-470080.7	1164472.6	3820448.2	
396.000	6352567.2	20841755.7	-145990.8	-478972.5	1222776.1	4011732.5	
404.000	6340590.2	20802461.2	-148687.3	-487819.2	1282829.1	4208756.7	
407.301	6335389.7	20785399.0	-149795.8	-491456.0	1308113.8	4291712.0	
407.301	6335389.7	20785399.0	-149795.8	-491456.0	1308113.8	4291712.0	

INJECTION

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR I=90.0 FUEL 3064K+524K (MDK PAYLOAD)

TIME SEC	APOLLO 13		VELOCITY COMPONENTS		ZDOT	
	XDOT M/SEC	FT/SEC	M/SEC	FT/SEC	M/SEC	FT/SEC
LIFT-OFF	.000	.000	-391.618	-1257.027	-13.984	-45.880
	.000	.000	-381.618	-1250.027	-13.984	-45.880
	4.000	17.381	-381.617	-1252.026	-14.048	-46.089
	8.000	35.576	-381.622	-1252.039	-14.112	-46.299
BEGIN TILT	8.000	35.576	-381.622	-1252.039	-14.112	-46.299
	12.000	54.588	-381.596	-1251.955	-13.470	-44.193
	16.000	74.405	-381.561	-1251.879	-11.391	-37.372
	20.000	95.022	-381.516	-1251.693	-7.834	-25.703
END TILT	20.000	95.022	-381.516	-1251.693	-7.834	-25.703
	24.000	116.458	-381.462	-1251.515	-2.884	-9.461
	28.000	139.676	-381.399	-1251.308	4.151	13.618
	32.000	161.567	-381.328	-1251.059	13.592	44.593
	36.000	184.976	-381.244	-1250.799	25.726	84.403
	40.000	208.674	-381.152	-1250.499	40.788	133.819
	44.000	232.272	-381.051	-1250.169	58.923	193.318
	48.000	255.175	-380.941	-1249.807	80.136	262.915
	52.000	276.597	-380.822	-1249.415	104.261	342.064
	56.000	296.157	-380.693	-1248.993	131.179	430.377
10 KMS.	60.000	314.378	-380.555	-1248.541	161.184	528.817
	62.000	324.730	-380.471	-1248.266	180.179	591.140
	64.000	332.302	-380.408	-1248.057	198.963	639.644
Q MAXIMUM	67.708	348.805	-380.267	-1247.583	229.933	754.375
	68.000	350.101	-380.251	-1247.544	232.845	763.928
	72.000	367.789	-380.086	-1247.001	275.081	902.496
14 KMS.	73.690	375.190	-380.013	-1246.763	294.182	965.163
	76.000	385.382	-379.911	-1246.477	321.927	1056.192
	80.000	402.845	-379.727	-1245.823	373.602	1225.730
	84.000	419.997	-379.534	-1245.189	430.163	1411.295
	88.000	436.534	-379.331	-1244.526	491.486	1612.487
	92.000	452.247	-379.120	-1243.832	557.474	1828.983
	96.000	466.968	-378.900	-1243.109	629.020	2060.433
100.000	480.564	1576.653	-378.678	-1242.356	703.011	2306.467
104.000	492.922	1617.199	-378.432	-1241.574	782.323	2566.676
108.000	503.930	1653.315	-376.154	-1240.762	845.788	2840.513

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR I=90.0 FUEL 3064K+524K (40K PAYLOAD)

TIME SEC	APOLLO 13 VELOCITY COMPONENTS				ZDOT	
	M/SEC	FT/SEC	M/SEC	FT/SEC	M/SEC	FT/SEC
112.000	513.541	1684.846	-377.928	-1239.921	953.316	3127.677
116.000	521.740	1711.745	-377.663	-1239.050	1044.858	3424.812
120.000	528.522	1733.995	-377.388	-1238.151	1140.377	3741.393
124.000	533.885	1751.592	-377.105	-1237.222	1239.940	4067.718
128.000	537.847	1764.591	-376.813	-1236.264	1343.257	4407.011
132.000	540.433	1773.073	-376.513	-1235.278	1450.663	4759.393
136.000	541.292	1775.891	-376.203	-1234.262	1561.041	5121.525
140.000	539.762	1770.873	-375.885	-1233.218	1672.258	5486.411
144.000	535.944	1758.346	-375.558	-1232.145	1784.181	5853.612
148.000	529.942	1738.654	-375.222	-1231.044	1896.724	6222.847
152.000	521.852	1712.114	-374.878	-1229.914	2009.811	6593.869
156.000	511.766	1679.023	-374.525	-1228.756	2123.376	6966.457
160.000	499.767	1639.655	-374.163	-1227.570	2237.358	7340.413
164.000	485.932	1594.265	-373.793	-1226.355	2351.703	7715.560
168.000	470.334	1543.092	-373.414	-1225.112	2466.362	8091.738
172.000	453.042	1486.359	-373.027	-1223.841	2581.291	8468.803
176.000	434.119	1424.274	-372.631	-1222.542	2696.451	8846.624
180.000	413.624	1357.034	-372.226	-1221.215	2811.805	9225.082
184.000	391.614	1284.822	-371.813	-1219.860	2927.320	9604.069
188.000	368.141	1207.811	-371.392	-1218.477	3042.966	9983.495
192.000	343.255	1126.163	-370.962	-1217.066	3158.716	10363.240
196.000	317.002	1040.033	-370.523	-1215.628	3274.543	10743.250
198.156	302.303	991.808	-370.284	-1214.841	3336.987	10948.120
199.156	302.303	991.808	-370.284	-1214.841	3336.987	10948.120
200.000	284.632	933.832	-370.076	-1214.161	3336.375	10946.114
204.000	246.324	808.148	-369.621	-1212.667	3334.992	10941.574
208.000	208.036	682.532	-369.157	-1211.145	3333.530	10936.777
208.156	206.546	677.645	-369.139	-1211.086	3333.471	10936.585
208.156	206.546	677.645	-369.139	-1211.086	3333.471	10936.585
209.156	206.546	677.645	-369.139	-1211.086	3333.471	10936.585
212.000	183.804	603.033	-368.685	-1209.596	3388.916	11118.492
220.000	135.732	445.316	-367.715	-1206.413	3506.832	11505.355
228.000	86.583	284.064	-366.711	-1203.120	3628.318	11903.931
236.000	36.266	118.984	-365.673	-1199.716	3753.563	12314.838

SEPARATION

OPR IGNITION
-BEGIN-MIN-H

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MDC/HCR I=90.0 FUEL 3064K524K (40K PAYLOAD)

TIME SEC	APOLLO 13 VELOCITY COMPONENTS					
	M/SEC	YDOT	FT/SEC	M/SEC	FT/SEC	ZDOT
244.000	-15.313	-50.239	-364.602	-1196.201	3982.771	12738.749
252.000	-68.258	-223.945	-363.497	-1192.576	4016.167	13176.400
260.000	-122.683	-402.503	-362.359	-1189.842	4153.997	13528.600
268.000	-178.708	-586.313	-361.187	-1184.997	4296.532	14096.235
276.000	-236.469	-775.816	-359.982	-1181.042	4444.071	14580.286
284.000	-296.111	-971.491	-358.743	-1176.978	4596.944	15081.838
292.000	-357.795	-1173.867	-357.471	-1172.805	4755.519	15602.098
300.000	-421.699	-1383.528	-356.165	-1168.522	4920.207	16142.411
308.000	-488.022	-1601.123	-354.827	-1164.129	5091.466	16704.286
316.000	-556.883	-1827.373	-353.455	-1159.628	5269.816	17289.423
324.000	-628.830	-2063.091	-352.050	-1155.018	5455.841	17899.741
332.000	-703.842	-2309.192	-350.611	-1150.300	5650.208	18531.429
340.000	-782.334	-2566.714	-349.140	-1145.473	5853.680	19204.995
348.000	-864.620	-2836.844	-347.636	-1140.537	6067.132	19905.289
356.000	-951.781	-3120.673	-346.099	-1135.494	6290.013	20636.527
364.000	-1041.651	-3417.491	-344.529	-1130.344	6513.504	21369.764
372.000	-1136.021	-3727.104	-342.926	-1125.096	6736.087	22100.024
380.000	-1234.288	-4049.502	-341.291	-1119.722	6957.673	22827.011
388.000	-1336.446	-4384.565	-339.624	-1114.251	7178.171	23550.429
396.000	-1442.485	-4732.562	-337.924	-1108.675	7397.491	24269.982
404.000	-1552.393	-5093.151	-336.192	-1102.993	7615.542	24985.375
407.301	-1598.863	-5245.615	-335.468	-1100.618	7705.118	25279.257
407.301	-1598.863	-5245.615	-335.468	-1100.618	7705.118	25279.257

INJECTION

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

MOC/HCR I=90.0 FUEL 3064K+524K (40K PAYLOAD)

APOLLO 13 ACCELERATION COMPONENTS						
TIME SEC	X000Y		Y000Y		Z000Y	
	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2
LIFT-OFF						
0.000	4.217	13.836	.001	.002	-.016	-.052
0.000	4.217	13.836	.001	.002	-.016	-.052
4.000	4.447	14.589	-.000	-.002	-.016	-.052
8.000	4.651	15.259	-.002	-.005	-.016	-.053
8.000	4.651	15.259	-.002	-.005	-.016	-.053
12.000	4.854	15.925	.008	.025	.738	1.110
16.000	5.054	16.582	.010	.033	.703	2.306
20.000	5.255	17.240	.012	.049	1.077	3.535
20.000	5.255	17.240	.012	.049	1.077	3.535
24.000	5.458	17.906	.015	.048	1.444	4.868
28.000	5.646	18.523	.017	.056	2.047	6.716
32.000	5.795	19.114	.019	.054	2.686	8.812
36.000	5.901	19.359	.021	.071	3.391	11.126
40.000	5.925	19.441	.024	.079	4.144	13.597
44.000	5.862	19.233	.026	.087	4.928	16.169
48.000	5.558	18.236	.029	.094	5.671	18.687
52.000	5.137	16.853	.031	.102	6.386	20.951
56.000	4.631	15.194	.033	.109	7.067	23.196
60.000	4.494	14.744	.036	.117	7.951	26.085
62.307	4.480	14.597	.037	.121	8.520	27.951
64.000	4.466	14.653	.038	.125	8.948	29.357
67.708	4.437	14.556	.040	.132	9.924	32.560
68.000	4.435	14.549	.040	.132	10.004	32.820
72.000	4.410	14.469	.043	.140	11.125	36.499
73.680	4.400	14.437	.044	.143	11.615	38.107
76.000	4.385	14.366	.045	.147	12.308	40.379
80.000	4.342	14.246	.047	.155	13.535	44.408
84.000	4.221	13.350	.049	.162	14.740	48.359
88.000	4.039	13.251	.052	.170	15.918	52.225
92.000	3.811	12.502	.054	.172	17.071	56.009
96.000	3.544	11.629	.056	.185	18.197	59.701
100.000	3.243	10.659	.058	.192	19.294	63.301
104.000	2.923	9.580	.061	.199	20.351	66.768
108.000	2.578	8.458	.063	.207	21.376	70.131

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)
(Continued)

MDC/HCR I-90.0 FUEL 3064K+524K (40K PAYLOAD)

APOLLO 13 ACCELERATION COMPONENTS									
TIME	SEC	M/SEC**2	XDDOT	FI/SEC**2	M/SEC**2	YDDOT	FI/SEC**2	M/SEC**2	ZDDOT
	112.000	2.227	7.305	-065	.214	27.386	73.444		
	116.000	1.873	6.144	.067	.221	27.384	76.718		
	120.000	1.518	4.980	.070	.229	24.774	79.966		
	124.000	1.165	3.821	.072	.236	25.359	83.199		
	128.000	.817	2.662	.074	.243	26.351	86.453		
	132.000	.477	1.565	.076	.250	27.356	89.750		
	136.000	-.087	-.285	.078	.257	27.709	90.907		
	140.000	-.673	-2.208	.081	.265	27.896	91.523		
	144.000	-1.232	-4.041	.083	.272	28.062	92.065		
	148.000	-1.765	-5.792	.085	.279	28.207	92.542		
	152.000	-2.276	-7.466	.087	.286	28.334	92.960		
	156.000	-2.764	-9.068	.089	.293	28.446	93.326		
	160.000	-3.232	-10.605	.091	.300	28.543	93.645		
	164.000	-3.682	-12.080	.094	.307	28.627	93.922		
	168.000	-4.114	-13.497	.096	.314	28.700	94.161		
	172.000	-4.530	-14.861	.098	.321	28.763	94.366		
	176.000	-4.930	-16.173	.100	.328	28.816	94.540		
	180.000	-5.315	-17.438	.102	.335	28.860	94.685		
	184.000	-5.689	-18.660	.104	.342	28.896	94.804		
	188.000	-6.047	-19.839	.106	.349	28.926	94.900		
	192.000	-6.394	-20.979	.109	.356	28.948	94.974		
	196.000	-6.734	-22.081	.111	.363	28.964	95.028		
	198.156	-6.907	-22.660	.112	.367	28.971	95.049		
SEPARATION	198.156	-9.582	-31.438	.112	.367	28.971	95.049		
	200.000	-9.580	-31.430	.113	.370	28.971	95.049		
	204.000	-9.574	-31.412	.115	.372	28.971	95.049		
	208.000	-9.569	-31.396	.117	.384	28.971	95.049		
	208.156	-9.569	-31.395	.117	.384	28.971	95.049		
ORB IGNITION	208.156	-8.487	-27.844	.117	.384	28.971	95.049		
BEGIN MIN-H	208.156	-5.887	-19.313	.117	.384	28.971	95.049		
	212.000	-5.945	-19.505	.119	.391	28.971	95.049		
	220.000	-6.075	-19.930	.123	.405	28.971	95.049		
	228.000	-6.215	-20.389	.128	.419	28.971	95.049		
	236.000	-6.366	-20.887	.132	.432	28.971	95.049		

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(Continued)

APOLLO 13 ACCELERATION COMPONENTS									
TIME SEC	XDDOT		YDDOT		ZDDOT				
	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	M/SEC**2	FT/SEC**2	FT/SEC**2
244.000	-6.531	-21.425	.136	.446	16.408	53.832			
252.000	-6.708	-22.009	.140	.460	16.946	55.598			
260.000	-6.900	-22.639	.144	.474	17.517	57.470			
268.000	-7.109	-23.323	.149	.487	18.123	59.459			
276.000	-7.334	-24.063	.153	.501	18.768	61.576			
284.000	-7.579	-24.867	.157	.515	19.457	63.837			
292.000	-7.845	-25.739	.161	.529	20.195	66.256			
300.000	-8.135	-26.689	.165	.542	20.987	68.853			
308.000	-8.450	-27.724	.169	.556	21.839	71.651			
316.000	-8.795	-28.855	.174	.569	22.760	74.673			
324.000	-9.172	-30.093	.178	.583	23.760	77.952			
332.000	-9.587	-31.453	.182	.597	24.848	81.522			
340.000	-10.044	-32.952	.186	.610	26.038	85.427			
348.000	-10.549	-34.605	.190	.624	27.346	89.718			
356.000	-11.065	-36.303	.194	.637	27.989	91.828			
364.000	-11.553	-37.992	.198	.651	27.881	91.475			
372.000	-12.040	-39.591	.202	.664	27.762	91.084			
380.000	-12.527	-41.494	.206	.677	27.632	90.657			
388.000	-13.013	-42.622	.210	.690	27.490	90.192			
396.000	-13.497	-44.281	.214	.704	27.338	89.690			
404.000	-13.980	-45.885	.218	.717	27.173	89.152			
407.301	-14.178	-46.516	.220	.722	27.102	88.919			
407.301	-14.178	-46.516	.220	.722	27.102	88.919			

INJECTION

Table C-4. Trajectory Tables for the Mission with an Inclination of 90°
and a Cargo of 18,143.694 kg (40,000 lbs)

(concluded)					
I = 90°					
ROCKET EXHAUSTION HCR SHUTTLE					
TIME	.40730073+03 SEC	RANGE	.12842770+07 M	RANGE ANGLE	.11560655+02 DEG
INITIAL VELOCITY	.78764032+04 M/SEC	RADIUS	.64707821+07 M	FLIGHT PATH ANGLE	.41538776-06 DEG
INCL	.89999999+02 DEG	DES. NODE	.98060092+00 DEG	FLIGHT AZIMUTH	.18209864+03 DEG
GOLAT	.23330277+02 DEG	GOLAT	.23190069+02 DEG	LONG	-.11460413+03 DEG
INITIAL AZIMUTH	.18000000+03 DEG	C1	.50966631+11 M**2/SEC		
WEIGHT	.29274236+06 LBS	C3	-.61163586+08 M**2/SEC**2		
KEPLERIAN ORBITAL PARAMETERS					
ECCENTRICITY	.70979451-02	APOGEE RADIUS	.65532591+07 M	PERIGEE RADIUS	.64707444+07 M
APOGEE HEIGHT	.99942798+02 NM	PERIGEE HEIGHT	.49988863+02 NM		

REFERENCES

1. McDonnell-Douglas, "Detailed Mass Properties," Report MP-8A, March 15, 1971.

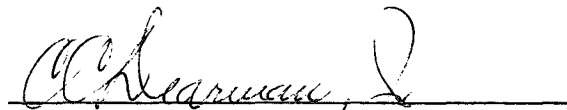
APPROVAL

PERFORMANCE VERIFICATION TRAJECTORIES FOR THE
MCDONNELL-DOUGLAS HIGH CROSS-RANGE SHUTTLE CONFIGURATION

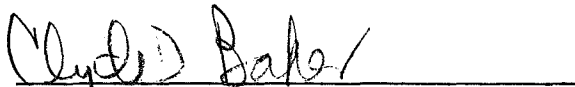
by Orval E. Etheridge

The information in this report has been reviewed for security classification. Review of any information concerning Department of Defense or Atomic Energy Commission programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

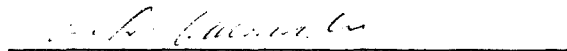
This document has also been reviewed and approved for technical accuracy.



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